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The Geographical Journal

INCLUDING THE PROCEEDINGS OF THE ROYAL GEOGRAPHICAL SOCIETY.

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The
Geographical Journal.

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THE GLACIERS OF NORTH AMERICA.

By Prof. ISRAEL C. RUSSELL, University of Michigan.

There is a popular impression that for the proper study of glaciers one must visit Switzerland. A tramp through that country is instructive and highly enjoyable, I freely admit, but in this paper I wish to show, among other things, that an American need not leave his own continent in order to gratify his taste for mountaineering and glacier study. We are greatly indebted to the many explorers who have climbed the Alps, for observations and theories concerning the nature and origin of glaciers, and are also under lasting obligations to European students for a vast amount of information concerning the time when much of the northern hemisphere was buried beneath vast ice-sheets, but for the study of both existing glaciers and the records of the Glacial epoch, North America furnishes an abundance of material. Before reviewing the present status of our knowledge concerning the glaciers of North America, let us endeavour to obtain a clear idea of what a glacier is, even at the expense of repeating what may be regarded as elementary information.

Suppose a climatic change should occur of such a nature that the snow falling over the surface of New England each winter should not be entirely melted during the succeeding summer. If the remnant left over from one year to the next were a foot thick, in a thousand years the land would be buried beneath a thousand feet of ice. The covering would be mainly ice, and not snow, except in its superficial portion, for the reason that the summer melting would lead to the saturation of the snow left unmelted, and when cold weather came it would freeze. Consolidation of the lower portion of the accumulation would also result from pressure. A cubic foot of ice weighs about 57 lbs. At the bottom

of an ice-sheet 1000 feet thick the pressure would be 579 lbs. to the square foot. Now, since ice, in common with many other solids, behaves like a plastic body when subjected to sufficient pressure, a thick layer will tend to change its shape of flow under the influence of gravity. Without attempting to discuss the vexed question of the causes of glacial motion, I may say, as a result of accumulated observations, that an ice-sheet a thousand feet thick over New England would acquire motion and flow in all directions, the motion being greatest where it was favoured by the slope of the land. Such a bed of ice as we have built up in fancy is what is termed a glacier; that is, a glacier is a body of ice formed by the consolidation of snow, which flows by reason of its own weight.

The climatic change which would permit of the formation of a glacier over New England would be a lowering of the mean summer temperature to such a degree that the snow falling each winter would not be melted during the succeeding summer. In other words, a change in the mean summer temperature to about 32° would be required.

Such climatic conditions as we have assumed are not in violation of the laws of nature. There are numerous localities on the Earth's surface, ranging from the equator to the poles, where snow accumulates from year to year.

Mountains under the equator in Africa and South America, 18,000 feet or more in height, are snow-capped throughout the year. The lowest limit of snow at the season of greatest melting is known as the snow-line. That is, the snow-line is the lowest limit of perennial snow. As one travels either north or south from the equator, the snow-line descends lower and lower, and finally reaches the level of the sea in high latitudes. The conditions favouring the formations of glaciers are met with, then, in any region where the land rises above snow-line. We find, on examining such regions, not considering minor conditions, that glaciers originate above the snow-line, and, descending below it, melt away.

The places where perennial snow is possible outside the polar regions are on high mountains. The snow falling about lofty peaks accumulates most deeply at the heads of valleys and in great amphitheatres, and flows from these gathering grounds as streams or rivers of ice. These ice-rivers frequently descend, not only below the snow-line, but in numerous instances well below the highest limit of tree-growth or the timber-line. These long, narrow, river-like streams of ice were first studied in the Alps, and hence are known as "alpine glaciers."

Some alpine glaciers not only descend below the snow-line and traverse valleys bordered by luxuriant vegetation, but reach the plains adjacent to the mountains and spread out as nearly level ice-sheets. When several alpine glaciers expand in this manner and unite on a plain, a lake-like ice-body is formed. Such ice-bodies differ in many ways from

their feeding ice-streams, and it is convenient to designate them by a separate name. Their occurrence about the bases of mountain ranges has led to the suggestion that they be termed "piedmont glaciers."

Glaciers also originate on plateaus and plains, where the winter's snow is not completely melted, as in the hypothetical case of the origin of a glacier in New England. The climatic conditions favouring the accumulation of perennial snow over broad plateau-like surfaces occur at the present time only in high latitudes. Under the conditions named, the ice flows in all directions from the central region of accumulation, unless local topographic influences prevail. These accumulations of ice are, in certain typical instances, of broad extent. The areas covered by them are, in fact, comparable with continents, and we term them "continental glaciers." At the present time a continental glacier covers nearly the whole of Greenland. In the southern hemisphere, the climatic conditions favouring ice-accumulation on low ground again occur, and we have the antarctic ice-cap, with an area approximately equal to that of North America, and an estimated thickness in the central part of many thousands of feet.

Glaciers of any of the three types I have mentioned, that is, the alpine, piedmont, and continental, may enter the sea. When this happens, the ice usually breaks off and floats away as bergs. On account of the well-marked characteristics of glaciers which terminate in this manner, it is convenient to have a general term by which to designate them, and we call them "tide-water glaciers."

Investigations carried on in North America by various explorers, have shown that we have many hundred, and possibly several thousand, glaciers of the alpine type. Two characteristic examples of piedmont glaciers are known in Alaska, and Greenland furnishes a typical example of continental glaciers. Several of the alpine glaciers of Alaska end in the sea; the great Malaspina glacier, the type of piedmont glaciers, also touches the sea for a few miles at Icy cape, near Mount St. Elias, and the Greenland ice-sheet sends thousands of bergs afloat. We have, in fact, many magnificent examples of tide-water glaciers.

America thus furnishes characteristic examples of all the types of glaciers now known, a statement that cannot be sustained in reference to any other continent.

All the glaciers of North America, not considering for the present those of Greenland or the arctic archipelago, are confined to the Cordilleran region, adjacent to the Pacific coast. We there find a belt of snow-capped mountains over 3000 miles long, and from 80 to 100 miles broad in its widest part, in which glaciers are of common occurrence. This great belt of shining mountains is curved so as to be rudely crescent-shaped. The extreme southern end of the crescent is in east-central California, and its north-west extremity on the larger of the Aleutian islands. At its ends this curved belt of snow and ice is

broken into detached glaciers of small size, situated at high elevations among overshadowing peaks; but in its broadest portion, in the neighbourhood of Mount St. Elias and Mount Logan, the snow-line descends to within about 2000 feet of the sea, and hundreds of ice-streams come down to sea-level, and a score or more meet tide-water.

The most southern glacier in North America, so far as known, with a possible exception of perennial snow and ice about the summit of Popocatepetl in Mexico, occurs amid the most lofty peaks of the High Sierra, in Eastern California. In that region there are several peaks, such as Mount Lyell, Mount Ritter, Mount Dana, etc., which attain elevations of over 13,000 feet. These splendid summits are white throughout nearly the entire year, but in late summer, when seen from the southward, they seem to be completely bare of snow. On their northern sides, however, in the shelter of great cliffs, small snowfields may be seen from a distance at the season of greatest melting, but if one visits these snow-banks as they appear to be from a distance, he finds them to be actual glaciers. They are small, but present many of the characteristics of even the largest ice-streams of the alpine type. The larger, the one on the north side of the summit peak of Mount Lyell, is not over a mile long, but on traversing its surface one finds very many of the features common to true glaciers. There is an upper region of snow, or a *névé*, and a lower region of compact banded ice. Crevasses, glacier-tables, moraines, etc., as well as striated rock surfaces adjacent to the ice, are all present. Nothing is lacking, in fact, to make this and several other ice-bodies of the High Sierra, strictly counterparts of typical alpine glaciers, except the river-like form characteristic of the larger glaciers of Switzerland.

North of High Sierra, for several hundred miles, glaciers are absent. In fact, in the Sierra Nevada proper no glaciers occur except those mentioned above, in the highest and most rugged portion of the range.

Mount Shasta is a volcanic mountain with a double summit, standing west of the north extremity of the Sierra Nevada, and distinctly separate from that range. This splendid peak, rising in its solitary grandeur to a height of about 14,500 feet, is white with snow through the year, and from its summit gives origin to five glaciers. The largest of them, an ice-stream of the characteristic alpine character named Whitney glacier, in honour of Prof. J. D. Whitney, of Harvard, has a length of a little over two miles, and is from 1000 to 2000 feet wide.

The general line of elevation marked out by the rugged summits of the Sierra Nevada, is continued northward by the scarcely less imposing Cascade mountains. The Cascades also have a high central region in West Central Washington, where several peaks attain an elevation of 8000 feet or more. The snow-line is there lower than in California, and the climate far more favourable for the accumulation of perennial snow. In this, the High Cascades, as they may be termed, there are

scores of glaciers, some of them of what may be termed respectable size, but as yet they are unexplored. From the summit of Glacier peak, in Northern Washington, the writer has counted fifty veritable glaciers, and somewhat extended explorations in that region have shown that fully two hundred glaciers still exist there.

An outstanding watch-tower of the Cascades on the east, and separated from the crest of the main range by a belt of 20 to 30 miles of rugged country, is afforded by Mount Stuart, 9470 feet above the sea. This lone summit, rising spire-like from a group of encircling foothills, commands a most magnificent and far-reaching prospect of the Cascade region. Standing on the summit of Mount Stuart, or, better still, on the apex of some one of its score or more of supporting peaks, having elevations of about 7500 feet, the eye ranges over a region containing many objects of magnificence. To the south-west rise the snowy domes of Mount Hood and Mount Adams. Apparently near at hand, especially on the wonderfully clear days following storms, although some 70 miles distant, stands Mount Rainier, beloved of all the friends of nature who have ever seen its glorious summit. Below the gleaming snowfields, sheathing all the higher portions of this the finest single mountain in the United States, south of Alaska, there are several ice-streams which descend far into the encircling forests. More will be said in what follows of these fine glaciers.

What especially attracts the eye of the geographer who stands on the summit of one of the rugged foothills of Mount Stuart—particularly when the sun is rising above the distant cloud-like mountains of Idaho, or when only the summit of Rainier is aflame with the rosy light of the after-glow—is the generally even sky-line of the Cascades. On looking westward, one beholds what seems a vast plateau, rising gradually from far to the east of his station, like a great smooth surface swell of the sea, and attaining its maximum height along the sky-line to the west, about 7000 feet above tide. The plateau referred to, or, what is more nearly the case, the great elongated flat-topped dome, appears to have a smooth surface, because the valleys are in shadow, or filled with purple haze, and their presence lost to view. Mount Rainier stands on the Cascade plateau, and similar to it in position are Mount Hood in Oregon, Mount Adams, Mount Baker, and Glacier peak in Washington. Each of these commanding summits, once aglow with volcanic heat, is now glacier-crowned. From each peak long tongues of ice, forming typical alpine glaciers, descend in all directions, and in several instances invade the dark coniferous forests with which the lower slopes of the mountains are clothed.

The finest of these series of radiating glaciers clusters about the summit of Mount Rainier, 14,526 feet above the sea, and flows far down its rugged sides before melting away. In this cluster there are at least ten glaciers which descend below timber-line. These are bordered by

pine and spruce trees, and flow between precipitous banks decked with gorgeous alpine flowers. The larger of these very characteristic glaciers, named in honour of S. F. Emmons of the U.S. Geological Survey, one of the first explorers to climb the great peak, is about 7 miles in length, and approximately a mile broad. Examples of all the typical features of the glaciers of Switzerland are here illustrated. Few glaciers in any country can show finer ice-cascades, crevasses, moulins, glacier-tables, moraines, etc., than are encountered by one who climbs Mount Rainier.

Alpine glaciers, in many ways typical of their class, occur in the elevated valleys of Montana. Still finer ones may be reckoned by the score in the central ranges of the justly famed Canadian Rockies. As the great Cordilleran belt is followed northward, the ice-streams descend to lower and lower levels, and finally in the southern extremity of Alaska, a few miles north of Fort Wrangell, they enter arms of the sea and become tide-water glaciers.

Travellers who have ascended Stikine river, which rises in British Columbia and flows west across South-Eastern Alaska, have described several fine examples of alpine glaciers, which descend from lateral canyons and encroach on the river itself, thus adding a unique attraction to its marvellous scenery. It was in the neighbourhood of the Stikine that Muir discovered a large lake, held in a lateral valley by a glacier which crossed its mouth. Glacial lakes of this type are common in the more extensively glacier-covered region to the north.

After sighting the floating ice discharged by Hotlum glacier, or the thunderer, just referred to, the tourists who visit Alaska by the usual route leading through the land-locked waters separating the many islands of British Columbia and South-Eastern Alaska from the mainland and from each other, see several glaciers above the dense forests fringing the coast, but none which reach tide-water are met with until Taku inlet is traversed, and the magnificent ice-cliffs of Taku glacier meet their astonished gaze. Taku glacier has its source far back in the mountains, in a region as yet entirely unexplored, and flows seaward through a deep rock-walled valley as a veritable river of ice nearly a mile broad. Where it enters the sea the ice stands in sheer cliffs of the most marvellous shades of blue and white, about 200 feet high. The ceaseless onward flow of the glacier is counterbalanced by the breaking away of great masses of ice from its terminus. These fall from the face of the ice-cliffs in avalanches, whose thunder is sent back in deep-toned reverberations from the surrounding mountains. The ice set free, after centuries of imprisonment, floats away as gleaming bergs.

The visitor to the wild Alaskan shores, who derives his first tangible ideas of a tide-water glacier from the one at the head of Taku inlet, will say, I think, that nothing could be at the same time more exquisitely beautiful and more awe-inspiring. If, however, his wanderings are to be continued westward, I would bid him wait.

The sail up Lynn canal, the route so many fortune-hunters are now following on their way to the Yukon goldfields, reveals scenes of wondrous beauty. Forest-covered shores, with many bays and inlets, overshadowed by rugged precipices, leading upward to snow-covered mountains, are the elements that in various combinations make up the ever-changing panorama bordering Lynn canal on either side. In the valleys between the ragged and serrated mountains there are scores of glaciers, some of which descend steep precipices and form beautiful ice-cascades. When the mists shroud the mountain-tops, these broken ice-falls seem cataracts of foam descending from the sky. The number of glaciers along Lynn canal can scarcely be realized by one who traverses that great inlet, once a river valley, but now flooded by the sea; but let the tourist climb some of the rugged peaks which command a far-reaching view over the deeply sculptured land, and every valley will be found to be partially ice-filled. On one occasion, from a peak about 3000 feet high near Dyea, I counted forty alpine glaciers, and a change in position of a few rods brought still others into view.

None of the glaciers on Lynn canal actually enter its waters, but a number come down to within a few hundred feet of sea-level. The most conspicuous of these is Davidson glacier, which expands on emerging from a deep high-grade valley, and forms a delta-like ice-mass fringed with a dense belt of spruce trees.

The reader who has patiently followed our lead thus far, perhaps needs to be encouraged by the statement that we are only on the border of the glacier wonderland. Scenes far more marvellous than any previously seen await the traveller who sails westward along the sublime Alaskan coast.

The next indentation of the land west of Lynn canal is Glacier bay. On entering Glacier bay from Icy straits, one sees before him a broad inlet, studded by fleets of gleaming bergs or packed with floating ice, so as to call to mind the accounts given by explorers of the borders of the arctic ocean. The head of the bay is beyond the reach of vision as one enters it, but far beyond rise white mountains of marvellous splendour. The highest of these is Mount Fairweather, which, although as yet not accurately measured, is over 15,000 feet high, and, with the exception of its steepest cliffs, is ice and snow covered from base to summit.

About the head of the inlet several large glaciers reach the sea, and break off in towering cliffs of ice. The largest and best known of these, named in honour of the discoverer of Glacier bay, John Muir, the well-known writer, drains an area of 800 square miles. A score or more glaciers of the alpine type there unite their floods of ice, which is forced out through an opening between rugged mountains about a mile broad, and breaks off in a manner characteristic of tide-water glaciers. The splendid palisade of ice in which the glacier terminates is from 250 to

300 feet high. The depth of water from which it rises is about 700 feet, making the thickness of the glacier at its terminus 1000 feet. From these shining cliffs, huge masses of ice, sometimes reaching from below the water's surface to the crest of the palisade, break away with a deafening roar, and topple over into the sea. During warm summer days these occurrences are repeated every few minutes, and in fact at such times the echoes from the neighbouring mountains are seldom silent. The scene beheld from the deck of a vessel anchored a mile from the terminus of Muir glacier is impressive, and will be long remembered by all who have feasted their eyes upon it; but still more wonderful scenes await one who climbs a neighbouring peak, and has in view the hundreds of square miles of rugged mountains from which the glacier derives its many tributary ice-streams.

Looking down on the glacier from a commanding station for the first time, one is filled with awe and wonder at the vastness of the panorama before him. The rough broken ice, with shining pinnacles separated by profound crevasses of the deepest blue in the central part of the stream just before it makes its final plunge into the sea, reveals the line of most rapid movement. The rate of ice-current is there about 7 feet a day during the summer, but is less in winter.

Turning from the ice-cliffs and rugged surfaces above them, and looking northward, one sees a broad valley, the bottom of which seems a nearly level pavement of ice. The way in which the mountains rise out of this ice-sheet shows it to be of great thickness. Not a tree is in sight, and not a trace of vegetation in all of the broad wintry landscape, except the exceedingly brilliant alpine flowers at one's feet. Far to the north rise white-robed peaks. Each valley between them is occupied by an ice-stream. One can count a score of separate glaciers, which unite to form the broad ice-field in the main valley.

Several other glaciers of the same general character as the Muir enter Glacier bay, and many more descend nearly to tide-water, but melt away before being able to add their contributions to the countless bergs that whiten its waters.

West from Glacier bay, the mountains which rise directly from the beating surf of the Pacific to great heights are bare and desolate, but in brilliant weather shimmer in the sunlight like burnished silver. Snow and ice fill every ravine and valley, and thousands of domes and precipices are sheathed in crystal. For 250 miles the coast-line is unbroken save by one small inlet, not easily accessible to ocean-going vessels. The next opening in the land is Yakutat bay, about 60 miles eastward of Mount St. Elias. The head of this inlet forms a long narrow waterway, which bends about the bases of the mountains like a broad river. Entering this land-locked estuary are four glaciers of the type of those discharging into Glacier bay. One of these, named in honour of Gardiner G. Hubbard, for many years president of the National Geographic

Society, is larger than Muir glacier, and ends in a mighty palisade of ice, which is even more magnificent than those we have just left in our fireside wanderings.

To the west of Yakutat bay there is a plateau of ice some 20 miles broad, which intervenes between the base of Mount St. Elias and neighbouring mountains and the Pacific. This ice-sheet at sea-level is fed by a number of large glaciers of the alpine type which flow down valleys in the mountains to the north, and has an area of about 1500 square miles, and its surface is, in general, about 1500 feet above the sea. This ice-sheet is strikingly different from any of the glaciers thus far considered. It has no gathering ground or *névé* fields of its own, but is supplied by ice-streams in much the same way that a lake at the base of a mountain range is fed by torrents. The ice-sheet in question has been named the Malaspina glacier, in honour of one of the earliest explorers of the Alaskan coast. As stated on a preceding page, it is the type of a class of ice-bodies termed piedmont glaciers. One of its most novel features is the presence of a forest growing on the dirt and stones which conceal the ice. Many square miles of dense vegetation have at least 1000 feet of ice beneath them.

At one place the Malaspina glacier enters the sea, and, breaking off, forms the finest tide-water glacier in the Alaskan region. This is the only locality on the west coast of North America where a glacier meets the surges of the open ocean.

From nearly everywhere on the ice-sheet at the base of Mount St. Elias the precipitous southern slope of that great peak is in sight. The mountain rises 16,000 feet above the broad glacier encircling its southern base, and has an altitude of 18,100 feet above the sea. The vast avalanches that rush down its southern slope illustrate on a grand scale the manner in which mountain peaks rising into regions where melting is unknown, are freed of their accumulations of snow. The avalanches feed the glaciers not only with snow and ice, but contribute to their freight of stones and dirt as well.

Mount St. Elias and its giant neighbour Mount Logan, 19,500 feet high, and, so far as now known, the loftiest summit in North America, rises from the most thoroughly glacier-covered region on the mainland of the continent. From the northern slope of Mount St. Elias, at an elevation of 14,500 feet, the highest point reached by the present writer in 1891,* the country to the northward, as far as the eye can reach, presents a vast succession of snowfields, with here and there a bare peak or crest too steep to allow snow to rest upon it. In this great gathering-ground hundreds of alpine glaciers have their birth. The largest yet discovered is the Seward glacier, the principal tributary of the Malaspina, which is about 50 miles in length, and about 3 miles

* In 1897 the summit was reached by the Duke of the Abruzzi's party.

broad in the narrowest part. The *névé* region just referred to has a general elevation of about 8000 feet, with hundreds of mountain peaks towering far above that horizon, and extends from the region about Lynn canal and glacier bay, westward past St. Elias and Logan to the vicinity of Copper river. This is the broadest portion of the crescent-like belt of glaciers and snowfields which follows the Cordilleran mountains from Central California to the Aleutian islands. To the west of Mount St. Elias the snow-line again rises, the snowfields become less and less extensive, and the glacier shrinks back farther and farther into the shelter of the peaks and mountain crests.

In Alaska and British Columbia, to the north of the mountains near the border of the Pacific, perennial snow is absent, and glaciers are unknown.

A journey from the High Sierra in Central California northward along the Cordilleran mountains would furnish hundreds, and probably thousands, of examples of alpine glaciers, and illustrate every phase that such glaciers present. In addition, the only known examples of piedmont glaciers would be found near the base of Mount St. Elias. To enlarge our studies of the glaciers of North America, and to add an example of a continental glacier to our list, a review is necessary of the work of explorers in Greenland and on the islands to the west of Baffin's bay and Smith sound. The greatness of this field, however, will preclude more than a brief outline of the facts known concerning it.

The area of Greenland, as stated by Peary, is about 700,000 square miles, and of this area about 600,000 square miles are buried beneath a glacier of the continental type. The central part of this covering is 8000 feet, and over, above the sea. As described by Nansen, Peary, and others, it is in reality a vast *névé* field, or gathering-ground, from which there is an outward flow in all directions. Throughout many hundred square miles in its central portion, the surface of the snow is unbroken by mountain peaks. The only feature that meets the eye of the hardy explorer is a seemingly boundless plain of snow. In travelling from the interior towards either the east or west coast, as has been shown, especially by Nansen's highly successful journey in 1888, one would at length see island-like summits of mountains, termed nunataks, projecting above the generally level snow surface. On a nearer advance to the coast, the nunataks would become larger and more numerous. Within sight of the Atlantic, or of Baffin's bay and the water connecting with it, strips of rugged land many miles in length form the actual coast. The central ice-sheet, many hundred and possibly seven or eight thousand feet thick, does not flow away from the central area of accumulation equally in all directions, but the outward drainage is influenced in a marked way by the topography of the land. The ice is drained off through the valleys, forming stream-like glaciers simulating alpine glaciers in some of their features. A continental glacier is thus a

reservoir for the supply of lobes of ice and of well-defined ice-streams extending out from its border. Some of the streams draining the Greenland ice-sheet are from 10 to 30 miles broad. One of them, the Humboldt glacier, which flows west into waters leading to Baffin's bay, is reported to have a breadth of 45 miles where it enters the sea. This and other ice-streams on the Greenland coast are tide-water glaciers, and the largest of this class in the northern hemisphere. The bergs set adrift in Baffin's bay are reported to rise, in some instances, from 200 to 300 feet above the sea's surface; as they float with only about one-seventh of their mass above water, some idea of their immense size, and of the magnitude of the glaciers which gave them birth, can be realized. It is the bergs from this great factory, principally on the west coast of Greenland, that reach the Grand Banks and endanger trans-Atlantic commerce.

The tongues of ice extending out from the vast central gathering-ground in Southern Greenland, but melting away before reaching the sea, end in low frontal slopes in much the same manner as do alpine glaciers similarly situated in Alaska. In Northern Greenland, however, as has been carefully recorded by Chamberlin and others, the glaciers which end on land terminate in precipitous, and even in some instances in overhanging, escarpments 200 feet or more in height. These glaciers end on the land in cliffs of ice quite as steep as those found at the extremities of tide-water glaciers in more southern regions. The reason for this remarkable feature of the extremities, and also of the borders, of glaciers in the far north has not been clearly explained, although Chamberlin has made the suggestion that it is owing to the low angle of incidence of the sun's rays. The direct rays from the sun, as well as the reflections from the sea surface, reach the ice in nearly horizontal planes, and not at high angle as in more southern latitudes. Whether this is a sufficient reason for the peculiarities referred to, however, remains to be determined.

Remarkable glaciers discovered on Grinnell Land by the Greely expedition have been described by Lieut. Lockwood, as ending in great walls which could be traced across the land for many miles. One of these escarpments of ice is termed the "Chinese Wall," but it is a wall only when seen from the south, being the margin of a plateau of ice. The brief accounts brought by General Greely and others from the far north, although not as satisfactory as could be wished, are sufficient to show that many things of extreme interest to glacial students there await study.

We have now passed the existing glaciers of North America in rapid review, and can judge to some extent of the richness of this continent in objects of special interest to the student of glacial geology. It is safe to say that the mountains of the Cordilleran system hold thousands of glaciers of the alpine type, ranging in size from the great Seward

glacier, probably the largest of its class known, to the small ice-bodies of the High Sierra. There are also two piedmont glaciers known, one the Malaspina glacier, briefly described in this paper, and a second on the coast to the west of the Mount St. Elias, and named Bering glacier. This second example, however, has only been seen from a distance, and no white man, so far as I am aware, has ever set foot upon it. Of continental glaciers, the one in Greenland is the only example in the northern hemisphere, unless the recently discovered ice-sheet of Franz Josef Land should prove to be of this type.

Space will not permit of a comparison of the glaciers of North America with those of other regions, but it is safe to say that no other continent affords such a variety of ice-bodies, or in such numbers.

It might be said that it is unfortunate America should have so much ice, but this is a matter which may be considered in two or more ways. The moderating influence of glaciers on climate, their conservative action on water-supply, etc., are frequently far-reaching and beneficent. To the geographer and geologist, glaciers are of more than passing interest, not only as illustrating the intricate working of the laws of nature at the present day, but for the reason that they furnish the key for unlocking a most interesting and instructive chapter in the Earth's history. But for the study of existing glaciers, the records of the Glacial epoch would still be a sealed book.

THE ENVIRONS AND NATIVE NAMES OF MOUNT EVEREST.

By Major L. A. WADDELL, LL.D., I.M.S.

As so little is yet known respecting Mount Everest, owing to its inaccessible position far within the jealously guarded territory of Nepal and Tibet, from which Europeans are rigidly excluded, I here record some notes on its nomenclature and topography which I have gathered during a visit to the Semorum pass, in the Yalung valley of Eastern Nepal, and from a Tibetan map and other sources.

Of the alleged native names for this mountain, which in this country is designated after Colonel Everest, the founder of the Indian Trigonometrical Survey, which revealed the surpassing height of this mountain, the one that is still current for it amongst continental cartographers, namely, Gaurisankar, has been conclusively proved by the late Colonel Tanner to be the name, not of Everest, but of a much smaller and totally different mountain altogether, about 40 miles to the west of that giant.* Moreover, Colonel Tanner and General Walker have

* On this controversy upon the identity of Everest and Gaurisankar, see *Alpine Journal*, xii., 1886, pp. 483–469; *Proceedings R.G.S.*, New Series, 1886, vol. viii. pp. 88-94, 176–188, 257–263; vol. xiii., 1891, pp. 108–111; *Petermann's Mitteilungen*, xxxiv., 1888, and pp. 251–252, 1890.

shown that, owing to the curvature of the Earth, it is physically impossible to see Everest at all from the Kakani ridge and Kaulia peak above Khatmandu, in Nepal,* whence Hermann Schlagintweit believed he saw it and derived this name of Gaurisankar, which is an Indian title of the conjugal Hindu god Shiva. Nor is Everest visible from Tonglu (or even from Phalut), whence H. Schlagintweit made his sketch of the peak which he supposed to be the Everest of the Survey.† For this latter reason, also, I may add that Hooker's name of "Tsangau," which expressly referred to a mountain seen from Tonglu, could not designate Everest, even were it the specific name of a particular mountain or range, which, however, it is not. Because this word "Tsangau," notwithstanding the attempts to twist it into a support of the Gaurisankar theory, is a purely Tibetan word, and literally means "The Snows of Tsang"—Tsang, of course, being the adjoining province of Tibet, to the north of the Himalayas of Sikhim and Eastern Nepal. The word "Tsangau," therefore, has no specific significance whatever as a mountain name. And further, as to Gaurisankar, not one of the many natives of Eastern Napal whom I interrogated on this subject, and who lived within sight of the Everest range, had ever heard of the name Gaurisankar as the name of any of those or of any other mountains.

So also with regard to the other Nepalese names, Bhairab Langur and Deodhunga—these do not denote either Everest itself or even, as Colonel Tanner seemed inclined to concede, the range of which Everest is the culminating point. For Bhairab Langur, or "The Terrible Pass," is the Indo-Nepalese name for that formidable Tibetan pass, the Gung Tang La, which lies about 50 miles north-west of Everest, on the track from Nepal to Lhasa *viâ* Nyalam, or "Nilam," as the Nepalese pronounce that Tibetan name. It was over this pass that the Jesuit fathers, in the sixteenth and seventeenth centuries, passed on their way between Nepal and Lhasa, and they have left a description of it on record.‡ And Deodhunga, or Deodhanga, the Indian vernacular for "God's seat or hill," is merely a general Hindu epithet for any sacred hill or hillock. There are hundreds of Deodhungas, but Everest is not one of them, as it is not sacred to the Hindus, nor even known to them as an exceptionally high mountain. For it lies so far behind the outer snows that its surpassing height is not apparent to the Nepalese, who seldom go near any of the snowy mountains, except the few which

* General Walker showed (in *Proceedings*, *loc. cit.*, vol. viii.) that Everest is 25' (minutes) below the horizon, and has a very different azimuthal direction from Kaulia than that assigned to the peak referred to by H. Schlagintweit.

† Dr. Emil Schlagintweit, in his rejoinder to Colonel Tanner in *Petermann's Mitteil.*, above cited, writes, "The point of view on the Singalila range from which the Gaurisankar group was drawn, as it appears in the Atlas to vol. i. of the *Results*, was the Tonglo peak."

‡ Kircher's *China illustrata*, and Georgi's *Alphabetum Tibetanum*, article "Mone Langur."

are sacred to the Brahmans, and Everest is not one of these. Hence has arisen the confusion in the names of peaks as obtained from Nepalese sources—owing partly to the extreme difficulty in identifying peaks from great distances, but mainly due to the remarkable looseness of the Nepalese in their nomenclature of the snowy mountains.

The Tibetans, on the other hand, worship all the snowy mountains individually; and they especially worship Everest as the abode of "The five sister-nymphs of Long Life," and also as the hermitage of their great saint Milarapa.* And troops of pilgrims regularly ascend its flanks as far as the latter shrine, and still higher, for purposes of worship.

The Tibetan name of the Everest range, as pointed out to me from the Semorum pass by a Tibetan resident of Khumbu, at the southern foot of that range, was "Lapchi-Kang;" and the highest peak of that range was said to be Jomo Kang-kar, or "The White Glacier Lady." Another informant, however, maintained that Jomo Kang-kar was to the west of Lapchi Kang. But both agreed that our Everest was known to the Tibetans as Lapchi Kang. These two names, as noted by Mr. Freshfield, in the *Proceedings R.G.S.*,† have already been mentioned by Baboo Sarat Chandra Das as the Tibetan names of the Everest range and its highest peak. But my informants stated that this Everest range is properly "The *lower* Lapchi-Kang," in contradistinction to "The *upper* Lapchi-Kang," which lies considerably to the north of Everest, in Upper Tibet, and is not visible from Nepal.

In support of this nomenclature, I have seen in some Tibetan manuscripts the *upper* Lapchi-Kang noted as a high mountain as well as the Lapchi-Kang on the Nepalese frontier. And in the printed vernacular topography of Tibet, which has been partly translated by the above Babu,‡ the mountain "Chomo-kankar" comes second in the list of great snowy mountains, immediately after mount Kailas ("Tesi'" or "Ti-se"), the Hindu Olympus, at the source of the Indus and Tsangpo; and it is described as lying in this locality in these words: "To the east of the Kirong district lies Nalam or Nanam, in the vicinity of which are . . . Toipa cave, the hermitage of the sage Milarapa, and Ch'ubar, the place where Milarapa died. All these places are on the Tibet-Nepal boundary. Close to them are the recluses' monasteries of Phelgya-ling and Targya-ling, in the neighbourhood of that grand and very lofty snowy mountain called Jomo Kang-kar, and at the foot of Lab-chhyi Kang, on the top of which are the abodes of the Ts'ering-tshe-nga, the five fairies who were devoted to Milarapa. At the foot of Lab-chhyi Kang, on the Tibetan side, are five glacial lakes, each differing from the others in the colour of its water. . . . Travelling northward

* See my 'Buddhism of Tibet,' p. 67 note, 371, 430.

† Vol. xiii. p. 109.

‡ *Journal of Asiatic Society of Bengal*, vol. lvi. pt. i. p. 1.

from Nanam, one arrives at the foot of a lofty mountain called Gung-thang La. . . . Crossing Gung-thang La, and going northwards, you arrive at the district of Tengri (Dingri)."

Some further interesting details of this locality are given in a curious Tibetan picture-map obtained by Mr. A. W. Paul at Darjiling. This map bears no title, but it evidently represents the southern flanks of the Everest range,* for it has inscribed upon it certain place-names which definitely fix its position here, namely, Ch'ubar,† the site of St. Milarapa's death, the Kyung (eagle-) cave, his favourite hermitage, several shrines of the Ts'ering-ma, the special nymphs of Lapchi Kang (Everest),‡ and on the top left and right hand corners respectively, are inscribed the names of the adjoining Tibetan districts to the north of Everest, namely, Nalam ("Nilam") and Dingri. As it gives a rough bird's-eye projection of villages, bridges, and pilgrims' routes on one of the flanks of Everest, with many new names,§ I have made a tracing of it, on which I have printed the names in Roman characters; and, whilst reproducing an exact transcript of the Tibetan spelling, I have added in thicker letters the spoken form when this differs considerably from the written, so that the names may be generally recognizable. A few of the names were too illegible to be deciphered.

In this picture-map, the snowy range at the top is represented as ending in five peaks of conventional form, of which the middle three are capped by clouds, and the other two snowy peaks on the right border, above Ch'ubar, are also cloud-capped. The bold cliffy peak between the two passes has such an individuality of form that it may possibly prove to be something of a portrait of the sacred rocky peak on the shoulder of Everest. The shrines and villages are all marked by fluttering prayer-flags; and in the original are figured numerous pilgrims ascending and descending the mountain-paths.

The names of the two snow-passes are labelled Laskyi Kang and Chi-tsi respectively. Both of these are somewhat suggestive of Lap-chi Kang. For there are many ways of spelling native names in Tibet, owing to frequent differences between the written and spoken forms of the majority of native names, which are not fixed by printing; and this mountain is seldom named in printed books, as these latter consist almost entirely of translations of Indian Buddhist works and commentaries

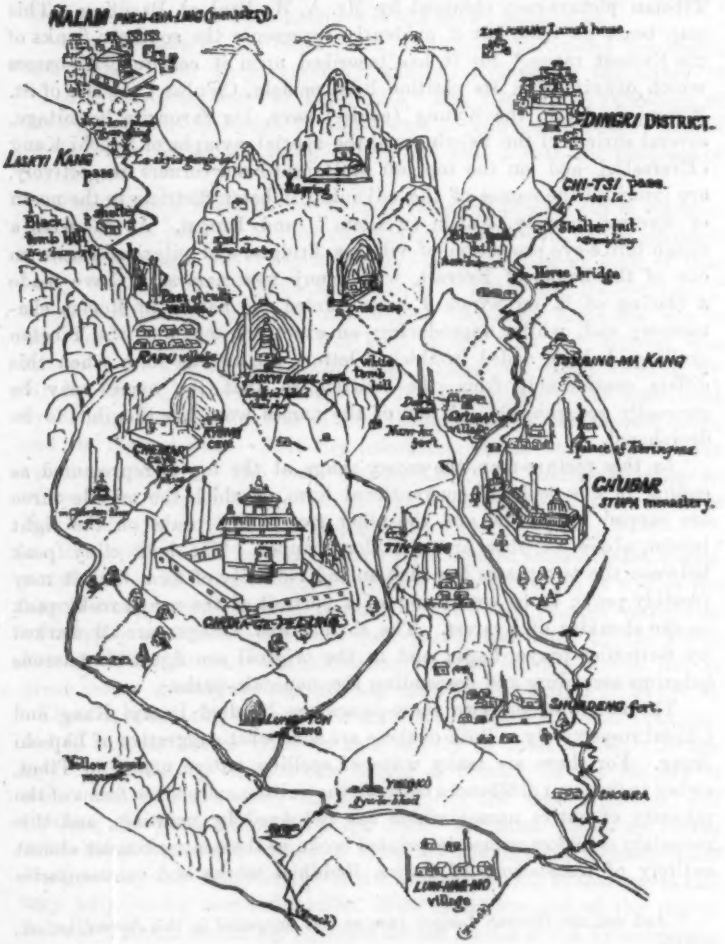
* And not the Bhairab Langur pass, as was suggested in this *Journal*, *loc. cit.*, p. 110.

† In addition to the reference in foregoing paragraph, see also my translation of Milarapa's biography in my 'Buddhism of Tibet,' p. 67, where the *b* is misprinted *g*.

‡ These, it is possible, give their name to Everest or Lapchi Kang, or have been suggested by a false etymology, thus—Lha-ch'e Kang means "The Icy Mount of the Divine Sisters."

§ As will be seen, the spelling differs materially from that given in the brief notice of the picture in the *Proceedings*, vol. xiii. p. 110.

thereon. This name, as seen by me in a Tibetan manuscript,* was written *Lab-ch'i*, which would mean "The Pass of Death;" † but my illiterate guide at the Semorum pass interpreted the word as meaning "the glacier-ice of the Outer pass," which would give the written form



TIBETAN PICTURE-MAP OF MOUNT EVEREST RANGE.

of *Lab-p'yi sgangs*, which is pronounced "Lapchi Kang." In this regard it may be noted that in the name of the right-hand pass in the picture

* My 'Buddhism of Tibet,' p. 67 n. The *b* is misprinted *g*.

† The *b* is inserted for euphony, as in Lab-rtse, "the top of a pass."

there is a suspicion of a trace of a *y* under the *p'*, which would also give this meaning of "Outer pass." Babu Sarat Chandra Das uses indiscriminately Lapchhyikang and Labchhyikang, Chomokankar and Jomo Kangkar, and also varies the spelling of other words,* so that it is not evident what the written form of the word was in his manuscript. The name of the left-hand pass, as written in the picture, although suggestive in sound to Lap-chi Kang, has the euphemistic meaning of "The Pass to Happiness," referring doubtless to Milarapa's attainment of *nirvāna* on this mountain.

None of the villages named on this picture are to be found on any of the Himalayan Survey maps to which I have had access. They would appear to lie to the east of the Pangu or "Pang-ji" pass, and presumably on a route not yet traversed by the native explorers of the Indian Survey. It is to be hoped that some explorer soon may penetrate the Everest range, and wipe out the standing slur on our geographical knowledge, in that, although its highest peak is visible from Darjiling and other parts of British territory, we know as yet next to nothing about the king of mountains.

OCEANOGRAPHICAL EXPEDITIONS.

I. The German Deep-Sea Expedition.

Letters have been received by Sir John Murray from Prof. Chun, the leader of the German Deep-Sea Expedition, giving particulars of the work on board the *Valdivia* down to September 14 last. After referring to the lively recollections cherished by all the members of the expedition of the hospitality extended to them during their visit to Edinburgh, Prof. Chun details one or two mishaps to the scientific apparatus and machinery; fortunately no one was hurt, and the damages were speedily repaired on board, so that the scientific observations suffered no interruption. The results so far obtained are of great interest to naturalists and oceanographers. Serial temperature observations were taken in the warm and cold areas of the Færoe channel, respectively south and north of the Wyville-Thomson ridge, which separates the ice-cold polar water flowing southwards from the warm Atlantic water flowing northwards, with the following results:—

	Cold area.		Warm area.	
Surface	9°·8 C. (49°·6 Fahr.)		10°·9 C. (51°·6 Fahr.)	
100 metres (55 fathoms) ...	7°·8 „ (46°·0 „)		9°·7 „ (49°·5 „)	
200 „ (109 „) ...	7°·6 „ (45°·7 „)		9°·7 „ (49°·5 „)	
300 „ (164 „) ...	6°·8 „ (44°·2 „)		9°·6 „ (49°·3 „	
400 „ (218 „) ...	3°·2 „ (37°·8 „)	Cold polar undercurrent.	9°·6 „ (49°·3 „	Warm Atlantic undercurrent
500 „ (273 „) ...	0°·4 „ (32°·7 „)		9°·0 „ (48°·2 „)	
600 „ (328 „) ...	0°·1 „ (32°·2 „)		— —	

* Thus Tshering-*tshe*-nga for Tshering-*mchhed*-nga. *Journal Bengal As. Soc.*, *loc. cit.*, pp. 7 and 8; and *R.G.S. Proceedings*, xiii. p. 109.

Generally speaking, these observations corroborate those taken on board H.M.S.S. *Knight Errant* and *Triton* in 1880 and 1882.

Regular observations are made on the specific gravity of the surface waters, and, as opportunity offers, on that of the deeper waters; also on the density, colour, and transparency of the water, and on the direction of the surface currents. A meteorological register is kept, in which observations are entered every four hours, day and night, and self-registering instruments give continuous records of the barometric pressure, the temperature, and humidity of the atmosphere. In the chemical laboratory, the gases and chlorine contained in many deep-sea waters have already been determined, and this work will be carried on systematically in the future. The samples of deep-sea deposits are collected and preserved by the chemist under Prof. Chun's personal supervision. In some of the deposits the bacteriologist has observed many forms of bacteria, and in the samples of water from the greater depths various species of bacteria have also been found.

The dredgings and trawlings, and the observations with closing nets in intermediate waters, have yielded results of the greatest importance. Some of the trawlings were very successful, although, the region having been previously well explored by British Expeditions, the captures mostly belong to known types. For instance, on August 7, in the cold waters of the Færoe channel, from a depth of 588 metres (322 fathoms), the trawl produced an extraordinary rich harvest of deep-sea sponges (Hexactinellids and Tetractinellids), among which were many sea-lilies (*Antedon*), sea-stars (Ophiurids), sea-spiders (Pycnogonids), and deep-sea crustaceans. It was found impossible to preserve all the specimens procured, which can be readily understood when we are told that of a deep-sea Tetractinellid (*Thenea muricata*) over four thousand examples were brought up. The closing tow-nets and large vertical nets have been used with remarkable success. Many deep-sea Crustacea (*e.g.*, *Eryoneicus*, *Acanthephyra*, *Notostomus*, etc.), which were taken in the dredge and trawl by earlier expeditions, and were therefore supposed to live on the bottom, have been proved to live a pelagic life, floating or swimming in the intermediate waters. But especially interesting is the discovery that a number of deep-sea fishes, believed by Agassiz and Günther to live on the bottom, are pelagic. Thus, from at least 2000 metres (1094 fathoms) above the bottom were obtained a living *Melanocetus murrayi* (or *johnstoni*), a *Saccopharynx*, and two quite new types of black fishes, whose heads have a metallic lustre and are provided with gigantic eyes, which are of cylindrical form and like telescopes can be directed upwards or forwards. When the vertical nets were sent down to 3000 metres (1640 fathoms), there were obtained large numbers of most remarkable pelagic deep-sea forms, including, besides the crustaceans and fishes already mentioned, gorgeous Radiolaria (*Tuscarora*), violet-coloured jelly-fishes (Siphonophoræ), large Ostracoda

the size of nuts, living gelatinous sea-slugs (Holothurians), strange cuttle-fishes (Cephalopods), and large new sea-butterflies (Pteropods), and it is possible to state with some exactitude the approximate depths in which all these organisms float, while the upper strata of water (down to 600 metres, or 328 fathoms) are apparently quite free from them. The interesting material procured by these closing nets is carefully examined immediately on being collected, so as to differentiate the organisms still living from those which are dead and have been captured in process of sinking towards the bottom. It may be recalled that Alexander Agassiz, as the result of his observations with closing tow-nets off the Pacific coast of Panama, declared his conviction that the intermediate waters of the ocean, from about 100 fathoms beneath the surface down to about 100 fathoms above the bottom, were uninhabited, but Prof. Chun's investigations evidently show that such is not the case. The botanist is paying special attention to the contents of these closing nets, with the view of determining to what depth below the surface living Diatoms, Peridiniæ, and Protococcaceæ descend.

On the way to the Canary islands, observations were made in the neighbourhood of the Josephine and Seine banks, which rise steeply from the ocean bed to within less than 100 fathoms beneath the surface of the North Atlantic. Around the Seine bank series of soundings and temperatures were taken, and the dredgings showed a great abundance of Crinoids (*Antedon phalangium*), Hydroids, and Antipathids.

Prof. Chun expresses himself pleased with the members of the scientific staff; each in his way takes his own share in the scientific work, superintending the manipulation of certain nets or special apparatus, so that the regular routine of the various deep-sea investigations now goes on smoothly. Captain Krech always maintains his good humour, and enters life and soul into the scientific work; he easily finds out the right methods of working the various appliances, and quickly detects any defaults in their mechanism; acting on his suggestions, changes have been made on board in the sounding-machines, which have turned out to be great improvements.

The expedition proceeds from the Canaries, by way of the Gulf of Guinea, to the Cape of Good Hope, Cape Town being reached early in November; and before sailing towards the antarctic ice, the Agulhas bank will be systematically explored.

II. The Austro-Hungarian Expedition to the Red Sea.

The work of the ss. *Pola* in the northern parts of the Red Sea has already been noticed in the *Journal* (1896, p. 180; 1898, p. 75). The investigations were continued between September 6, 1897, and May 24, 1898, in the southern Red Sea, from the latitude of Jedda to Perim, and thence to Aden, and a summary of the results has been prepared by Dr

J. Luksch. Besides numerous observations within the coral region, 54 deep soundings, 548 temperature observations, 305 determinations of salinity, 56 observations of transparency, and 102 of surface colour, were made at 123 separate stations. The shores of the southern Red Sea are little indented, the only inlets of importance are at Massowa, and at Kamaran, almost directly opposite. Animal and vegetable life are more abundant in the south than in the north, and there is a greater population. The land rises gradually on both sides from a low shore to a considerable height, limestone predominating in the northern region of the south basin, while the southern hills are volcanic in character. The relief of the sea-bottom from Jedda to the banks of Suakin and Farisan, in 20° N. lat., is of the same character as the northern part; the 100-fathom line keeps to the small coral-reefs, and pretty close inshore, and beyond it the bottom falls quickly to a great depth. The first expedition obtained a maximum depth of 1200 fathoms *north*-west of Jedda, and a similar depression of 1190 fathoms has been discovered about the same distance to the *south*-west; the two basins being separated by a ridge rising within 500 fathoms of the surface in the latitude of Jedda. Southward of this region the character of the bottom is essentially different, the shallow coral region, 300 miles long and 70 to 80 miles across, extending further and further seaward until in the latitude of Hodeida the deep channel (marked by the 100-fathom line) is only 20 miles broad, all the rest of the area being dangerous navigation to even small vessels. In the middle of the gradually narrowing channel three depressions were found; soundings were obtained in two of them—1110 fathoms in 20° N. lat., and 890 fathoms in 16° N. lat.—a little to the north of Massowa. To north-west of the volcanic island of Zebayir the depth is less than 500 fathoms; the bottom of the channel rises to the 100-fathom line at Hanish island (also volcanic), then shoals to 45 fathoms, and sinks again, about the latitude of Mocha, in a narrow channel which curves westward round the island of Perim (depth 170 fathoms), and loses itself in the Indian Ocean. This western channel is 16 miles wide in the straits of Bab-el-Mandeb; the eastern channel of the straits is 2 miles broad and 16 fathoms deep. The temperature of the water rises towards the southward, salinity at the same time decreasing. The type of distribution is similar to that in the northern part of the Red Sea; temperature is the same at all depths below 300 fathoms, and higher on the Arabian than the African side. The observations in the straits are of special interest: the distribution of salinity in Perim harbour, in the open sea to the south-east, and to the north within the Red Sea basin, as well as in the east and west channels, shows an inflowing current in the eastern channel of the straits, and an outflowing current of very salt Red Sea water in the western channel 50 to 100 fathoms below the surface. The "transverse currents" recognized by Luksch in the earlier work are also found in the south. In transparency and purity of blue colour, the water is again far behind that of the Mediterranean.

BALL'S 'ALPINE GUIDE.' NEW EDITION.*

Mr. Ball's death, which occurred in 1889, naturally suggested the idea of re-publishing his Alpine Guide. It was felt that no more worthy memorial of the first President of the Alpine Club could be imagined, for the last edition—the third—which Mr. Ball himself had prepared, was published in 1870. Although in many parts the original text could hardly be bettered, minute knowledge of the Alps had in the interval become so elaborated that the excellence of the work as a whole was in danger of being overlooked in favour of publications giving the results of recent exploration. The Alpine Club laid a very heavy responsibility on any one who undertook the task of revising the volumes. Ball's Guides—though perhaps not so widely known as they deserve to be—were held in the very highest estimation by those who were best able to judge of the merits of a guide-book, which not only dealt with the whole of the Alps, but devoted special attention to the higher regions. It was necessary that the new edition, if it was to be worthy of its original author, should more than hold its own among the countless guide-books now extant. As yet only one volume of the three is published, but we may say at once, that if the standard of this volume can be maintained, the Alpine Club has reason to be proud of the success that has attended their endeavour to do honour to the memory of their first President. For this result they have to thank their editor. No one was better qualified by wide and intimate knowledge of the Alps than Mr. Ball to write the original guide, and certainly no one, for the same reason, was so capable of revising and reconstructing it as Mr. Coolidge. An additional difficulty in the task of editing lay in the fact that the work was a new edition, and not a new book. Mr. Ball was possessed of a charming literary style, which even the writing of a guide-book could not conceal, and Mr. Coolidge throughout has evidently endeavoured, and not without success, to give us the new edition, so far as possible, as Mr. Ball himself might have penned it. The present volume deals with the mountain groups of the Maritime, Dauphiné, and Pennine Alps, together with the Cottian and Graian districts. The extent of the mountain and glacier exploration achieved since 1870, may be gathered from the fact that the present volume is half as large again as the former one. The actual bulk of the book is not, however, increased, as the whole of the introduction has been cut out. We understand that it is contemplated to publish this also, revised by high authorities, in a separate volume. Mr. Coolidge, however, gives an extensive list of books relating to the

* 'The Alpine Guide: The Western Alps.' By the late John Ball, F.R.S. A new edition, reconstructed and revised on behalf of the Alpine Club, by W. A. B. Coolidge. Longmans: London. 1898. With new and revised Maps.

Western Alps, of guide-books, Alpine periodicals (whose number is legion), and maps, together with a useful list of Club huts.

Without attempting any exhaustive notice of a book such as this—the full value of which can only be determined by actual use—we may note certain features in the new edition. As might be expected, information about the Dauphiné and Graian Alps has been largely extended, for of this district the editor undoubtedly possesses a greater knowledge than any one living. But other regions have by no means been neglected, and the editor has utilized the willing help of the most competent authorities, such as M. Louis Kurz, in the chain of Mont Blanc, and Mr. A. G. Topham, in the central and part of the eastern Pennines, to name only two out of many who have assisted. Those who, like the present writer, have used Ball's guide in the days when it was new, are disposed to be critical, and almost to resent any fresh touch or change in a volume they know so well, even when the alterations are unquestionable improvements. But a reviewer, even though actuated by this feeling, is silenced by the excellence of the work as a whole. To take one instance: we miss, if we can hardly regret, the omission of the well-known description of the ascent of the Dufourspitze of Monte Rosa, but we cannot but admit that it would be quite out of place in a guide-book for mountaineers of the present day. Scattered throughout the volume are numerous historical notes of much interest and value, and in many small points of detail the editor's accurate knowledge is evidenced and common errors are corrected. Thus Mr. Coolidge is careful to point out that the almost time-honoured idea that the Dom is the highest mountain wholly in Switzerland is incorrect, seeing that the frontier line between Switzerland and Italy runs south of the Dufourspitze. Again, as he points out, the summit of Mont Blanc lies wholly in French territory. It may be noted, in passing, that in neither case does the printing of the maps quite bear out these small geographical points. The arrangement of the index is an obvious improvement. In the original guide the entries were made under three different headings, one relating to the peaks or mountains, another to the passes, while the third formed a "general" index. Hotels are mentioned only in the index, and as this part can at any time be separately reprinted, the list can be kept up to date. It would be better also to place the list of Club huts at the end of the volume, for, as is pointed out in the preface, the building of a new mountain inn or Club hut, or the decay of an old one, entirely alters the mountain region from the point of view of the practical convenience of travellers. Included in the new volume are six district maps, one of the maritime, three of the Cottian, and two of the Graian Alps. In some respects these maps are hardly worthy of the work, but this is by no means the fault of the editor, whose work in connection with them seems very thorough. In addition there is a map of Mont Blanc and its

neighbours, including the Sixt district; one of the central Pennines, taking in the Grand Combin and extending east up to the Dent d'Hérens, together with the Val d'Anniviers, the Val d'Hérens and the Val de Bagnes. Also one of the Eastern Pennines which takes in the Monte Rosa group and the Mischabelhörner, extending on the east as far as Domodossola. These three last, altered from the Alpine Club map on a scale of about 4 miles to the inch, are clear and well printed. No doubt it is convenient in a guide-book to have maps for general reference, but the editor points out justly in his preface that explorers of the higher regions of the Alps "*must* employ the more or less perfect maps issued by the various Government Surveys."

We look forward to the publication of the second volume, which will deal with the Central Alps. It is not probable that any further editions of the 'Ball's Alpine Guide' will ever be published, and it is all the more satisfactory to recognize that the present volume is likely to maintain, for a long time to come, its position of the best guide-book for those who are attracted to the sub-alpine or glacier regions.

The publication has been long delayed for reasons set forth in the preface. But the subscribers are not likely to complain in their satisfaction at finding the work so well done. Mr. Coolidge has never employed his encyclopædic knowledge of the Alps to better advantage than in rebuilding of this monument to the memory of one who was justly venerated by all mountaineers.

THE CRAWFORD MAPPEMONDE REPRODUCTIONS.*

By C. RAYMOND BEAZLEY, M.A.

THE three maps here reproduced are: A. The anonymous "Harleian" example, of about A.D. 1536, supposed by some to be the work of Pierre Desceliers of Dieppe, and undoubtedly belonging, like the two following, to the Dieppese school of cartography (British Museum, Addit. MSS. 5413); B. The Desceliers map of 1546, called by Jomard "The Map of King Henri II.," and now belonging to the Earl of Crawford (Bibl. Lind., French MSS. 15); C. The Desceliers of 1550 (B. Mus., Addit. MSS. 24,065).

(A.) is the oldest existing specimen of Dieppese cartography. It measures 8 feet 2 inches by 3 feet 11 inches; is graduated for latitude only, to 73° N. and 64° S.; and is executed on parchment with many ornaments, figures, etc. It bears the royal arms of Francis I. of France, and those of the Dauphin Francis, the latter with some unfinished detail which may hint at the sudden death of the Prince (August 10, 1536) just at the time of the completion of the map.

In this example some of the results of Cartier's first two voyages to Canada in 1534–36 are apparently embodied, and a close resemblance is

* 'Bibliotheca Lindesiana,' Collations and Notes, No. IV. Facsimiles of Three Mappemondes. 1898.

to be seen with the North America of Hieronymo Verrazano (1529). Thus the isthmus of land above Florida, separating the North Atlantic from the "Western Sea" ("Sea of Verrazano," or supposed Pacific indent on the west coast of North America), appears in both, though in the Harleian map the isthmus is intersected by a river ("R. de St. Helene"). There is also some evidence of correspondence between this work and the Visconti de Maggiola Portolano of 1527; once more the Cattigara, or "Catagara," of Ptolemy's far East, turns up on the coast of Chili, and the "Camul" of Marco Polo's Central Asia is located on the west American coast, north-north-west of the Gulf of Mexico. But the draughtsman has evidently abandoned the notion of the American strand as a prolongation of Asia; an immense sea separates the two, in the middle of which is "Zipangri" (Japan), with a contour reminding one of an exaggerated Java turned on end (north to south).

Alexander Dalrymple, in 1786, was one of the first to describe this (Harleian) map, which then belonged to Sir Joseph Banks; and he argued, from the similarity of some names here given on the east coast of "Java la Grande" with Captain Cook's nomenclature for the east coast of New Holland (Australia), that Cook was here only following in the track of an earlier explorer. For instance, *Botany Bay* is the *Coste des Herbages*, his *Bay of Inlets* the *B. Perdue*, his *Bay of Isles* the *R. de Beaucoup d'Isles*, and his "*shore where the Endeavour struck*" the *Coste dangereuse* of this map (*Périleuse* of B.). This charge may, however, be regarded as without foundation, or at least unproven.

The Harleian Design has sometimes been confounded with the Desceliers of 1546 ("Henri II."); has too often been ignored in cartographical controversy; and deserves a closer study and a clearer differentiation. Some, as Major, have thought its date might be even referred to about 1530; few would now contend for a later year than 1540; Harrisse ('Jean et Sébastian Cabot') fixes it to 1542 (1533, in his 'Discovery of North America'), but denies the suggested Desceliers authorship. All Desceliers' other maps are dated and signed; this is neither. On the other hand, it is of identical scale (*e.g.* with B.) and of almost identical configuration and nomenclature in its equatorial portions, "extending from the Orinoco eastward to Java la Grande" (Coote). It is unquestionably a French map, closely resembling the works of the Dieppe school, and in particular those of Pierre Desceliers.

As to special features, we may notice (besides the isthmus and "Sea of Verrazano," the prominence of Java la Grande in "Australian" form, and the character of Zipangri, already noticed), that the Caspian (of Ptolemaic character) is united, according to mediæval notions, with the Northern Ocean by a narrow channel; that the north of Asia, including all the continent above India and Indo-China, is, as might be expected, almost valueless and decidedly inferior, *e.g.*, to Herberstein's delineation of Western "Sibier," etc. (1517-1526); that the draughtsman knows

next to nothing even of the east Asiatic coasts, now already coming within the ken of the Portuguese; that the Baltic regions have various curious features in this example, and may be both compared and contrasted with a map of 1492, among others (B. Mus., Addit. MSS. 15,760). The shape of North America, narrow and long-drawn-out from north to south, with an insignificant breadth, narrowing to an isthmus—itself divided by a "river"—somewhat north of Mexico, would be remarkable enough if it were in any way peculiar to this example, but this we know it is not. The delineation of Prester John and his work in Abyssinia is somewhat more elaborate than usual in maps even of this scale and elaboration. "Java la Grande," we may observe, is not explicitly joined on to the southern continent (which appears to the south of Magellan's Strait), but this is apparently due merely to the cutting short of the design at 64° S. lat.

On the coasts of Africa, South Asia, and South America, and among the East Indian islands, this map is a good chronicle of the progress of maritime discovery up to this date (*c.* 1536–1540). The draughtsmanship of the north-western shores of "Java la Grande" is clearly derived from Portuguese sources, and is plausibly supposed to indicate an early discovery of Australia by the Portuguese, as the alleged voyage of Binot Paulmier de Gonneville from Harfleur, in 1503, was probably limited to Madagascar (cf. the portolano of Francis Rodriguez, 1511–13? in Santarem's Atlas, 1849, fol. 84).

Whether the work of Pierre Desceliers or not, the Harleian map is the first and most important of the series, and we may fairly treat B. and C. as in the main derivatives of A.

(B.), the undoubted, signed, and dated work of Desceliers in 1546, measures 8 feet 2 inches by 4 feet 1½ inch, and is graduated for latitude to 80° 40′ N. and 62° 50′ S.; for longitude from Ferro, except for a space in the Pacific between 211° and 272°. It was once the property of the great French geographer M. E. F. Jomard, and is now that of Lord Crawford; it is given in Jomard's Atlas, and described in his introduction as executed "by order of Henri II. of France," about 1550; its exact date and authorship were undiscovered by him, by Avezac (who supposed it to be of 1542, in the reign of Francis I.), by Kohl, by Major (in 1873), and even by Rainaud (in 1893). The inscription, "*Faictes à Arques par Pierre Desceliers, presbre* 1546," was first noticed by Mr. Coote, of the British Museum, in August, 1879; communicated by Mr. R. H. Major to the Academy, May 18, 1878; and more widely published by M. Harrisse in his 'Jean et Sébastian Cabot,' 1882 (p. 216; cf. also p. 210).

In this it is noteworthy that the Great Southern Continent joining Tierra del Fuego with Java la Grande appears as "*La terre Australle: non du tout descouverte*"—although the southern prolongation of this example is not, by 1° 10′, so great as in A. The delineation of the

river and gulf of St. Lawrence shows an advance upon the Harleian example; De Roberval, commander of the French Canadian expedition of 1542, is depicted at the head of his soldiers; the coast-line of Nova Scotia and the United States is very different from the same upon the "Harleian." Further, the indent of the Sea of Verrazano has disappeared; the isthmus north of Mexico exists no longer; the conquest of Peru by Francisco Pizzarro in 1531 is noted; and the delta of the Orinoco is remarkably well drawn. Some use seems to have been made of the descriptions of Vespucci as to Brazil (third voyage), and of Mandevillian and other fabrications as to the races in North-East Asia, with their heads between their shoulders.

Northern Asia is not quite so inadequately conceived as on A.; the Caspian is not made to connect by a strait of sea with the Arctic Ocean, and the north-east of the Old World has a somewhat greater extension. But the coasts and upland from Canton round to Norway are not much more accurate than in the Harleian map. Only the space allotted, as in the case of North America, comes rather nearer to actual fact.

(C.) The Desceliers of 1550 (B. Mus., Addit. MSS. 24,065) is somewhat smaller than A. and B., though even more ornate. It measures 7 feet 2 inches by 4 feet 5 inches, but is on the same projection and scale. It is graduated from the equator to 84° 30′ N. lat. and 62° 30′ S. lat., and its longitude is reckoned from Ferro, with a gap between 270° and 175° 30′ in the Pacific. This work was discovered at Padua in 1847 by M. C. A. de Challaye, who first described it in the *Bulletin de la Société des Antiquaires de l'Ouest*, Potiers, 1852 (pp. 343–350).

Here are specially to be noticed the treatment of "Laborador" and "Terre Neufe," of the Gulf of St. Lawrence, and of the river Amazon, which here first appears in the Desceliers series of maps. For the coasts of Newfoundland we may compare the Nicolas Vallard Portolan of 1547, for the Labrador "Sebastian Cabot's" Mappemonde of 1544. The example of 1550 is specially notable for its inscriptions, on little slabs or notice-boards of space, scattered all over the world, and descriptive of various countries, peoples, places, etc. Twenty-five of these are particularly important, viz. one in South America (the longest of all), two in North America (the far north), eight in the southern continent or Terre Australle, two in Africa, one in Arabia, three in Southern and Central Asia, two in the north of Asia, one between the Caspian and Black sea, one at the arctic shore north of the Caspian, one in the position of Lapland, one in the ocean north of Iceland, and two north and north-east of Zipangri. Neither on B. nor C. does the Caspian communicate as a sea with the Northern Ocean.

The "great land of Java" south of the East Indies on all these maps seems undoubtedly to mean Australia—though the knowledge then possessed of that country (as shown here) was so imperfect that some have disputed this, and contended that the Desceliers maps only give us a "longitudinally misplaced portion of the south coast of Java

proper, plus a certain amount of purely theoretical cartography." The east coast-line of Java la Grande is not probably based on any real observations, though M. A. Rainaud has claimed at least the possibility of this, on the strength of the alleged discoveries of Guillaume le Testu. It does not seem to be derived from Spanish or Portuguese charts of this time, such as the Portolani of Diego Homem, 1558, and of F. Vaz Dourado, 1571, neither of which show any trace of an Australian or Antarctic continent, though some indication is given of New Guinea in Dourado's map. With this we may compare the *Las Papuas* of Desceliers. In the East Indies, to some extent, the Desceliers maps have been criticized as archaic and retrograde. The draughtsman has apparently misconceived the route taken by Magellan's expedition of 1519–22, of which, though he makes no express mention, he can hardly be supposed ignorant; thus in the design of 1550 the channel south of Timor is represented as if blocked, two men in a picture adjoining being engaged "with pick and shovel, as if in the act of cutting it open." Collingridge ('Discovery of Australia,' Sydney, 1895, p. 173; see also p. 116, on A.) considers, however, that this "channel between Java and Australia is evidently a concession due to the fact that a passage was known to exist," and he points out that this passage, though "painted over in the 1550 specimen," is "left white" in the Harleian map. On the other hand, Mr. C. H. Coote, our chief English authority on all questions connected with these maps, seems to deny that Desceliers had any knowledge of regions south of Java proper —a conclusion with which some will find it hard to agree. Also, beyond the name Las Papuas, no information is given us about New Guinea. In all this part of his work Desceliers probably owed something to Oronce Finè's *Nova et integra universi orbis descriptio*, whose *Bresille regio* is perhaps the origin of Desceliers' "Baye Brasille." Mr. Coote has furnished these reproductions with a masterly introduction (18 pp., privately printed, 1898) invaluable to every student. We may also, perhaps, draw attention to the new and improved method of reproducing these unwieldy documents, whereby the facsimiles can be consulted in detail, or as a whole, by the removal of the inner margins and the adjustment of the numbered sections edge to edge with the aid of the key-map. The Autotype Company deserves the cordial thanks of all students of historical geography for their success in this fresh line of reproduction, Mr. Coote for his supervision of the same, and above all, Lord Crawford for his munificent encouragement of cartographical research.*

* Besides the references given above, the student might consult: 'Early Voyages to Terra Australis' (Major), p. xxvii. and the map illustrations facing pp. xxvii. and xxix.; Harrisse, 'Discovery of North America,' p. 647, where A. is placed among "doubtful maps" of 1533; Jomard's 'Atlas,' plate xix. 1–6; Rainaud's 'Continent Austral,' pp. 288–291; Major in *Archæologia*, xliv. p. 235; Avezac in *Bulletin de l'Académie des Inscr. et Belles-Lettres*, August 30, 1867, p. 7; Kohl, 'Discovery of Maine,' p. 351; Delmar Morgan, 'Remarks on Early Discovery of Australia,' pp. 6–12.

MAP OF LAKE NYASA AND THE UPPER SHIRE RIVER.*

By ALFRED SHARPE, C.B.

THIS map is compiled from the work of two of the naval officers of the British Central Africa Protectorate, Lieut. E. L. Rhoades, R.N.R., and Lieut. Phillips, R.N.R., during the years 1896 and 1897. Lieut. Rhoades took the lake, and Lieut. Phillips the Upper Shire river. Numerous observations for longitude and latitude have been taken, and many bearings of all noticeable objects recorded. The coast-line of the lake has been very carefully worked out by Lieut. Rhoades. All the longitudes date from that of Fort Johnston. The longitude of Fort Johnston, again, dates from the accepted longitude of Blantyre, as laid down by Lieut. O'Neill.

Arrangements were recently made for the fixing of the longitude of some point on Lake Nyasa by telegraph from Capetown. When this is carried out, it may be found that the longitude of Fort Johnston, as at present given, is more or less incorrect. This will, however, affect the whole lake equally, and, so far as this map is concerned, will merely necessitate an alteration of the values of the degrees as given.

THE INFLUENCE OF GEOGRAPHICAL CONDITIONS ON SOCIAL DEVELOPMENT.†

By Professor PATRICK GEDDES.

WHAT the special sciences—mathematical, physical, and organic—have done, and are doing, for physical geography, in interpreting all its phenomena as parts of an orderly unity, as the products and factors of an increasingly intelligible evolutionary process, that physical geography in its turn seeks to do for political geography, taking this in its widest sense. Starting with the more obvious and accepted relations of nature and man, it seeks to elucidate these; correlating, for instance, with their respective physical conditions (as of position and relief, climate and natural resources, etc.), the distribution of races, their economic possibilities and aptitudes, their commercial and military history. But these, again, are obviously related in their turn with social organization and its outcomes. Thus, occupations conditioned by nature have often developed into tribal types or into castes; economic conditions have not only developed distinct types of social organization, but these again have crystallized into political or even religious ones; simple and once natural customs have become established as law or consecrated as ritual; it may be even retained long after their original significance has been

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* Map, p. 648.

† Abstract of Paper read at an Afternoon Meeting of the Royal Geographical Society, May 25, 1898.

forgotten. Hence it is that not only is the historian something of a geographer, and that increasingly so, but the student of language and literature also. All modern schools of thought and criticism have thus become so far geographical, since all are now agreed that not even the highest expressions of human individuality can be adequately studied apart from their physical conditions and antecedents of geographical environment, as well as of race and culture.

Accepting, then, from the physical geographer his description of region by region, and from the anthropologist, the historian, and political geographer, their accounts of the types of man, the races or nationalities inhabiting these, the study of mutual adaptation (of region and race) is, of course, a two-sided one. On one side we have to trace out for each given region more and more completely how far nature can be shown to have determined man. On the other side we have to inquire how far the given type of man has reacted, or may yet react, upon his environment. For such studies there is a wealth of material, though too little systematized, and even of generalizations, though too often incomplete. We need the more and more systematic correlation of each region with its people, of each people with its region; proceeding, of course, from simpler examples towards more complex, and awaiting full comparison before positively laying down geographical and social laws.

In such a resurvey of the globe, we have, of course, a vast mass of literature before us. Not only the observations of travellers, with general surveys like those headed by the "Géographie Universelle," but the interpretations of anthropologists and of sociologists must be utilized. Thus, familiar to most English readers (taking a specific instance, say that of natural selection through climate) must be Pearson's well-known pessimistic view of the future of the white race; taking, again, say the disastrous effects of disforesting, Marsh's 'Earth and Man' will long remain a classic. Among more general attempts, we have Mr. Spencer's 'Sociological Tables,' with their anthropological and historical facts and the corresponding generalizations of his 'Principles of Sociology,' and the more recent works of MacLennan, Stuart Glenie, Payne, and others in this country, with foreign sociologists too numerous for mention here. Not only recent and current literature of this sort, but the works of earlier writers—Ferguson or Gibbon, Buffon or Humboldt, Ritter, Buckle, or Taine—all claim renewed study; in large measure also those of Comte. In this respect, however, the writings of Le Play and his followers, in both schools (the older and more directly practical and economic, represented by "La Reforme Sociale," and the younger and more geographical and evolutionary, represented by "La Science Sociale") are of quite pre-eminent importance and interest; and it is to these that the writer's acknowledgments are chiefly due—to the latter more especially.

Given, then, the planetarium and globe, atlas and relief, given the knowledge of seasons and climates, rocks and soils, plants and animals, we must view our inquiry into the constants of anthropogeography as a higher kind of natural history. Thus the botanist not only recognizes the physical conditions limiting or favouring the plant-life of his region, but distinguishes what he terms plant-associations also. Every one knows, in a general way, that the forest determines its characteristic minor plant-life, and even the animal-life also; but the botanist is only beginning clearly to investigate this in detail, and for each of its dominant types or minor forests. For instance, in our own country, we may proceed upwards (in latitude or altitude alike) through zones characterized by beech and by oak, to that of Scotch fir and finally of birch. We find that each dominant species determines its characteristic surrounding minor flora with its subdominant, solitary, and dependent forms, and their innumerable actions and reactions. These, again, have their characteristic insects, their characteristic vertebrate life also. As the naturalist investigates this "higher physiology," as Mr. Wallace calls it ("bionomics" of Lankester, "œcology" of Haeckel), so it is for the anthropogeographer in turn to continue this into the bionomics of man. How does the forest affect him, determine him? What possibilities of development as hunter or forester, etc., does it open for him? What other possibilities does it restrict or close? The hunter of the Amazonian forests, the lumberman of Canada, the forester of Bavaria, or of the Indian Forest Department, each in his own grade of civilization, is a very definite type, and one surely at least as well worthy of monographic study by the geographer as the gall-insect or the woodpecker, to which the attention of the reflective naturalist cannot be permanently confined.

From the forest we may emerge upwards upon the higher pastures, or downwards upon the deep loamy glade. Beginning with the former, in Switzerland we shall find a drove of cattle, in Scotland a flock of sheep, in Cyprus a horde of goats, each with its own varied and manifold reaction on nature, and each also, and no less distinctly, with its characteristic associated type of man—Swiss herdman, Highland shepherd, and Moslem goatherd, with their widely divergent families and societies, ideas and ideals. To unravel them we must first go eastwards to simpler beginnings, to the great steppes from which have come the pastoral invasions.

The loamy forest glade has yet more varied possibilities and interests. It is the witch's clearing of fairy tale and folk-lore, and for recent anthropology the starting-point of matriarchal agriculture. From these early beginnings, from the mythology of culture-heroines and heroes, we must investigate onwards through that prehistoric golden age of agriculture to which we owe the domestication of most of our plants and animals, if we would understand either of the classic literatures of

Hebraism and Hellenism, with their ideals drawn from water-irrigation, from corn, vine, and olive, from fig tree and from palm. The progress of forest-clearing for pasture and agriculture, and by-and-by for urban and maritime construction also, is thus at first the main progress of the Eastern and Mediterranean lands, but later becomes their ruin. For here may be a factor in the decline of Rome, certainly largely in that of the modern Mediterranean from Spain to Syria—indeed, further east to Persia as well: and thus the interpretation of the Eastern question of to-day is in no small measure associated with the lamentable progress of disforesting. With this human factor we must, of course, also investigate the influence of the cosmic one, the apparently progressive desiccation of the East, to which many would largely attribute the pastoral invasions, perhaps even the earlier Aryan migrations themselves.

Similarly for fish and the fisher: the salmon-fisher of Norway, the whaler of Dundee, the herring-fisher of Yarmouth, the cod-fisher of Newfoundland, the sponge-fisher of the Ægean, each is a definite type, usually at least with characteristic family relations and social outcomes. This is well seen in the contrast of the Scottish fishwife with the Eastern woman in her tent. Again, note the skipper with his definite subordinate hierarchy, whence has come no small element in the strong governments of Western peoples, which can persist almost independently of private moral qualities—witness a pirate crew. Compare this with the weak government of the patriarchal East, which, from the very nature of its pastoral tradition, never succeeds in forming an organization of Western type—or at least in giving it permanence of succession.

Knowing not only such simple and elemental types of society, but their variations with the respective sub-regions they may inhabit, we may attempt the social interpretation of larger and complexer areas. The unit here is commonly the valley region inhabited by all these types—hunter, shepherd, agriculturalist, and fisher, each at his proper level. We have to see how these (1) may evolve or degenerate within their own region, through internal causes, *i.e.* the qualities and defects inherent in their particular social formation; and (2) how they act and react, how they combine with, transform, subjugate, ruin, or replace each other in region after region; and we may thus re-interpret the vicissitudes of history in more general terms, those of the ascending and descending oscillations of these social types. For at one time irrigation and intensive culture ascend the valleys, and its cities flourish and increase; at another the hunters and shepherds descend upon the plain, sometimes as a ruling race or caste, sometimes as a replacing one. In this case, the consequent diminution of food-yield per acre involves a corresponding reduction of population, from which cause, and not from any special ferocity, come the massacres which stain the history of all pastoral conquests, and form so perplexing a contrast to the gentleness and hospitality natural to shepherds in their natural home.

In the same way we may come to interpretations nearer home. In Scotland, with its varied individuality, its exceptional conditions of geographical isolation, not only of highland clans in their glens or borderers in their dales, but even of town from town, each upon its fortress-rock or fiord, we must proceed to distinguish the thrifty agricultural Saxon of the Lothians, the adventurous Scandinavians of the Northern and East Coast, the pastoral and imaginative Celts, and the social as well as racial hybrids of all these (the "Kelto-Viking" perhaps especially), before we can understand the heterogeneous variety of Scottish history and literature, much less interpret qualities and defects of social life.

So far an outline of the general method, its more precise application to societies and their environments is necessary, alike to the simplest societies and to the more complex. We may thus both test and develop our developmental method of interpretation, here upon the descriptions given by travellers of simple and complex societies from polar to tropical lands, or there upon the complex phenomena of contemporary evolution in our familiar record of current events, the morning newspaper (which becomes more and more of a popular journal of geography), ultimately, of course, reaching the well-ordered exhaustiveness of monograph.

Among many examples of interpretation of detail might be cited the observations of Nansen in Greenland, or of Thomson or other travellers in China; though, as regards the vexed question of method for monographing, in justice to the elaborate proposals of various schools, a full and separate survey is required, which would far exceed the limits of the present paper.

As a suggestive and convenient working outline, the following simple diagram may be recommended. Summarizing the doctrine above outlined as—

Place ⟶ Work ⟶ Family

these may be conveniently taken as the headings of as many parallel columns, within which we may summarize the main facts of each, so far as we can trace their sequence and interdependence. Taking, of course, a fresh sheet for each region or social type studied, comparisons of regions and races become more easy.*

Difficulties of course arise, and stimulate the development of this too simple outline. Thus, apart from the economic and material phenomena, it becomes necessary to distinguish, yet to parallelize the intellectual, moral, or other subjective aspects. Both needs may be broadly met by a simple convention—that of tabulating the objective phenomena upwards in our three columns, the subjective phenomena downwards; their

* A striking example of regional interpretations on this principle is afforded by the recent work of M. Demolins, 'La France Contemporaine" (Paris, 1898).

distinctness of aspect, yet their permanence of association, becomes thus apparent, such subjective phenomena as are clearly dependent upon the material evolution of society being alone thus treated.

But this treatment of many intellectual and even moral considerations as simply derived from economic conditions at once leads to a corresponding clear statement of the converse one. For while circumstances modify man, and that in mind as well as body, man, especially as he rises in material civilization, seems to escape from the grasp of environment, and to react, and that more and more deeply, upon nature; at length, as he develops his ideas and systematizes his ideals into the philosophy or religion of his place and time, he affirms his superiority to fate, his moral responsibility and independence; his escape from slavery to nature into an increasing mastership. For this view the parallel tabulation of facts is also possible, and that by simply reversing the previous diagram. The headings therefore read—

Society ⟶ Work ⟶ Place
(Ideals and institutions of family)

and the two aspects of each society then contrasted, like the Dr. and Cr. sides of an account. Concrete examples of this are being prepared for subsequent publication.

Such being the general idea, its development is in progress amongst many workers. So far as the writer and his colleagues and pupils have been concerned, their centre of teaching for the past seven or eight years has been the Edinburgh Summer Meeting, held annually in vacation-time; but is now permanently in the "Outlook Tower" of Old Edinburgh,* which is being arranged as a type-museum and observatory, alike of physical and of political geography. This is comparatively arranged, as far as may be, through its descending storeys (of Prospect, City, Scotland, Empire, Europe, World) on one hand in harmony with this conception of the unity and continuity of the natural with the social sciences; and on the other with the application of geography, thus unified and rationalized, to the comprehension and the conduct of practical affairs at every corresponding level—local or civic, regional or national, imperial or cosmopolitan. Taking the general summaries of geographical facts afforded by the great atlases and descriptive works, and imagining these unified and co-ordinated in a vast and simultaneous survey, such as that aimed at in the Great Globe of M. Élisée Reclus; this tower is readily understood as its necessary complement for any given region, since this for its inhabitants is necessarily both the starting-point and the returning point of even their widest thought and

* Since described in fuller outline at the geographical section of the British Association. See abstract in 'B.A. Report (Bristol), 1898.' Proceedings of Section E.

activity; it is the centre of their ideas and their practical life alike, for which no merely general and impartial world-survey is sufficient. Hence Education, if real, begins with a Regional Survey, as action with a regional usefulness. Hence such a regional type-museum and school of reference has to be not only geographic, but geotechnical. In the very difficulties of coping with the vast and perplexing division of labour, alike in science and in practical life, it finds its necessity and its justification as at least an attempted clearing-house of education, in which all specialisms may again meet. For it is not enough to postulate order and unity in nature, though that is the necessary and constant working assumption even of the most narrow specialist within his own field; we must demonstrate it in detail, and apply it in detail also. For if the evolutionist's promise of scientific synthesis is to be justified, it must descend from the region of philosophic abstraction to co-ordinate and interpret the whole facts of geography and history in that widest sense, in which these are no longer much neglected sub-sciences, but the all comprehensive account of the evolution of nature and human life throughout space and time.

The PRESIDENT: I now invite discussion on Prof. Geddes' paper. Perhaps Mr. Ravenstein would commence the discussion.

Mr. RAVENSTEIN: I feel quite sure that all those who have occupied themselves with similar questions will have agreed with much that Prof. Geddes has told us, and they certainly have appreciated the very interesting manner in which he has placed all these things before us. In discussing this dependence of men upon their surroundings, we must not go too far—and Prof. Geddes himself has said this—in concluding one thing from another; in concluding, for instance, that assassination must be traced to the occupation of some of our forefathers. We should be very careful about that. What I should like to say—and it is a thing many others have said—is, Do not be too sure about geographical environment. Undoubtedly it is a great influence, but we must not allow ourselves to be too much influenced by it. For instance, if we attempt to cultivate plants on an arid soil that require a rich soil, we are punished, and as we do not like being punished—and as mankind, take it at large, after all learns from experience—we avoid repeating those mistakes in order to escape the punishment. A specialist one day said, speaking about Ireland, "Certainly the Irish have been influenced by their insular position, but I do not say that if Ireland had been occupied by Anglo-Saxons its history would have been different."

Mr. J. A. BAINES: As I came here simply as a learner, and have not examined the diagrams, I feel that I can contribute little to the discussion. I should like to be in a position to ascribe more importance than I do at present to the influence of geographical conditions upon social development, but so far as I have studied the matter, I find no ground for such broad conclusions as those stated. No doubt these influences are of great moment in the primitive stages of society, but with the advance of civilization they tend to disappear, and the influence of man on his environment increases. In fact, a good part of the lecture may fairly be taken as a sermon on the text of "*Ce coquin d'homme restera toujours le même.*"

Dr. MILL: What strikes me most with regard to the subject of Prof. Geddes' paper is, that it is a matter for further research. If the conditions on which the

conclusions arrived at in the paper are based could be investigated in a more general way, and with the direct object of discovering how far those principles can be justified and extended, it would be a very good thing. Hitherto geographical research has been carried on very much in a haphazard way. Different travellers and explorers, and also a few theoretical men, have studied the subject without knowing exactly what they wanted to find out, but if they had before them some such definite thesis as that which Prof. Geddes has laid down, I think a very great deal of information would be gathered.

The PRESIDENT: As no one else wishes to speak, I should like to say a few words on the importance to travellers of the remarks in Prof. Geddes' paper. I should hope that pains will be taken to draw the attention of young travellers to the conceptions which are set forth in Mr. Geddes' paper and his diagrams with reference to the effect of food upon animals and upon the inhabitants of different countries, and to the effect and reaction of the inhabitants upon the vegetation, and what effect that has had upon them. I believe that the inhabitants have improved the physical condition of some countries, but I also believe that they have done ten times as much harm throughout the world as they have done good, and the consequence has been, no doubt, that there have been retrograde changes in their habits and in their progress. I have not had time to study with any care Mr. Geddes' paper, and I therefore do not venture to say more on the subject; but I have been much fascinated with the ideas which are conveyed to students in that tower (referring to diagram), and I hope some day to have the pleasure of visiting it in Edinburgh, and of studying the method of Prof. Geddes in teaching his pupils. I am sure the meeting will wish to return a very hearty vote of thanks to Prof. Geddes for a very interesting and suggestive paper.

Prof. GEDDES: If I may say a single word, it is that I would ask any who are interested in this thesis, and are disposed to follow it further, to begin in the remoter corners of the earth, not in London or Paris; but to begin in the isolated places in Scotland, in Cyprus for instance, where one gets a much more real and clear view of these things naturally than one can get here on the great English plain. It is as with geology, one must go to the places where geological facts are obvious.

MR. SAVAGE LANDOR'S TRAVELS IN TIBET.—A REVIEW.*

By Colonel Sir T. H. Holdich, K.C.I.E., C.B., R.E.

THE geographical results of Mr. Savage Landor's gallant but unsuccessful attempt to reach Lhasa from the Manasarawar Lake region are comparatively unimportant. It was impossible that they should be otherwise. The country that he succeeded in traversing was not altogether a *terra incognita*, for that interesting lake region (the fountain-head of the biggest river systems of India) which centres in the twin lakes of Rakas-tal and Manasarawar, has been visited by Europeans before Mr. Landor's time, and the route from the lakes to Lhasa has been traversed

* "In the Forbidden Land." By A. Henry Savage Landor. 2 vols. Heinemann, 1898.

by a well-trained *employé* of the Indian Survey, who travelled at his leisure, and mapped the topography of the district with painstaking care. We are indebted chiefly to the brothers Henry and Richard Strachey for our mapping of the two lakes, and those gentlemen are the authorities for that connection between the lakes which is shown in some maps, and should be shown in all. It was obviously impossible for a traveller so hampered with difficulties, and so restricted in his movements as Mr. Landor, to do full justice to the training which he had received at the Royal Geographical head-quarters in England, or to make full use of the instruments which the Society had lent him; so that he could hardly hope to supply the Society with material good enough to justify any fresh departure from the results attained by such scientific observers as the Stracheys, or the trained experience of "the Pundit." The maps which he has brought back do not differ materially in topographical detail from those with which he was supplied on his outward journey, and the record of observations consists mainly of a traverse which, when projected, can only be reconciled to the maps with difficulty. Observations for latitude, longitude, and altitude, are much wanting, especially the latter; for it is not easy to understand on what system the heights recorded on his map were either derived or computed. That Mr. Landor should have found it difficult to keep an accurate scientific record, or to take valuable observations, is not at all surprising; but he has fallen into the inexcusable error of making a positive assertion about the physical conformation of the lake surroundings without having actually traversed the ground to which he refers. He states that there is no connection between the Manasarawar and Rakas-tal, but he failed to push his exploration right across the intervening ridge so as to ascertain positively whether there was, or was not, such a connection. Every one knows that it is difficult enough to detect a ditch traversing a flat field until you come to the edge of it. When the field of view is not flat, but very much the reverse, the difficulty becomes an impossibility. Now the connecting "ditch" between the two lakes has not only been seen, but has been sketched, by Sir Richard Strachey; and it is to be hoped that ere long that thoroughly practical as well as scientific observer will give the Society the benefit of his observations in a fuller and more complete form than have as yet been available. The inevitable conclusion meanwhile is that Mr. Landor did not go far enough to see that connecting link, and that it would have been better had he not been quite so confident in the expression of his opinion.

ACCLIMATIZATION OF EUROPEANS IN TROPICAL LANDS.*

By Dr. L. WESTENRA SAMBON.

THE problem of tropical colonization is one of the most important and pressing with which European states have to deal. Civilization—by mitigating famine, war, and pestilence—has favoured unlimited multiplication, and thereby intensified that struggle for existence the limitation of which seemed to be its very object. The Old World would be unable to support its ever-increasing population if the balance were not kept by a constant flow of emigration, which fluctuates from year to year with the tide of social misery. This continuous dispersion has replaced the swarmings of savage life, when tribes of men were subject to such periodical migrations as are witnessed in the northern grey squirrel and the Norwegian lemming. I know full well that the question of emigration is beset with a variety of moral, social, political, and economic difficulties; but it is the law of nature, and civilization has no better remedy for the evils caused by overcrowding.

Looking for suitable areas whither to direct the torrent of our surplus population, we find that in the temperate zone there is no longer room for any great further immigration. Already North America and Australia resist the free immigration of paupers. But there remains the great tropical belt, with its vast and rich territories extending over more than a third of the surface of the globe. This, surely, must be the Promised Land; but we dare not enter, because at its gates stands a terrible monster—the Cerberus of prejudice.

It is the almost universal opinion that the European cannot colonize the tropics, but must inevitably fall, sooner or later, a victim to the influence of their deadly climate. I will endeavour to prove that this statement is wrong, and that there is no reason why the European should not conquer the tropical world.

The pessimistic opinion in regard to the tropical climate arose at a time when scientific knowledge was in its infancy, and when the enormous death-rate of Europeans, tenfold higher than that of the natives, seemed to prove beyond doubt that in the struggle for life in tropical regions the European was defeated. Within the last few decades, under the influence of sanitary science, wonderful changes have been wrought in the healthiness of tropical stations, and the changes have in many instances been so great that places which were considered the deadliest are now recommended as health-resorts!

In the light of new facts, the old theories were bound to crumble; but, strange to say, they still dominate public opinion. If the question of acclimatization has not closely followed in the train of modern thought, it is because of its complexity. It has hitherto been discussed mostly by statesmen, geographers, meteorologists, and journalists, who were bound to base their conclusions on such medical opinion as was accessible to them, no matter how obsolete and erroneous. Now, the medical aspect of the question is by far the most important, but, unfortunately, the one that has been most neglected, perhaps because we have necessarily more practitioners than scientists in the medical field.

The general opinion is that intertropical regions are inimical to the European on account of their climate. I will show you that this is not so; but, first, we must understand what is meant by the word "climate," because authors, when writing on tropical acclimatization, do not use it in its broad accepted meaning, but merely as a synonym of heat. According to them, the tropics are deadly because of their heat. Now let us consider this statement very carefully, because it is the pivot of the whole question.

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* Paper read at the Royal Geographical Society, April 27, 1898.

Those who believe that the heat of the tropics is noxious to Europeans, uphold their contention by stating that it induces disease, and they mention anæmia, hepatitis, and sunstroke. At one time, undoubtedly, these diseases were attributed to the direct and sole agency of solar heat, just as malarial fevers were attributed to the moonshine; but now they have been inscribed deeply on the tablets of bacteriology, and certainly the demonstration that disease belongs to the domain of parasitism is the greatest advance that medical science has ever made.

Anæmia, in the tropics, has been considered one of the most obvious consequences of heat. Some authors thought it a normal and protective condition, and went so far as to induce it in new-comers by venesection. Dr. Felkin called it *physiological anæmia!* But anæmia, in the tropics as in Europe, is a morbid condition of the blood common to several diseases, such as malaria and anchylostomiasis. It is never induced by heat. The observations of Maurel, Marestang, Eijkman, and Glogner have proved beyond doubt that in tropical regions the influence of high temperature causes no change in the amount of red corpuscles or hæmoglobin in the blood.

The various diseases of the liver common to Europe are also met with in tropical countries; but there the accepted etiology is forgotten, and they are curiously attributed to heat. The frequency of liver abscess in tropical regions has been advanced as a proof that it is caused by heat; but its limited and peculiar distribution, altogether independent of climatic conditions, is strongly against the meteorological theory. The frequent association of liver abscess with dysentery has led authors to believe that it may be due to the same parasite which causes the latter, and the *amœba coli* has been incriminated in both diseases.

The parasitic nature of anæmia and hepatitis having been generally recognized, sunstroke remained as the only condition that authors could bring forward to prove the noxious influence of tropical heat. But I firmly believe the febrile distemper called sunstroke in India to be an infectious disease (see *British Medical Journal*, March 19, 1898). My statement appears at first paradoxical, but it is far more surprising that the disease should have remained so long in the domain of astrology. The reason is perhaps that it was confounded with diseases and conditions of a very different nature, such as cerebro-spinal fever, pernicious malaria, cerebral hæmorrhage, alcoholic coma, and syncope, and because its mistaken nomenclature perpetuated an erroneous preconceived causation.

So-called "sunstroke," for which I have adopted the older and more appropriate name siriasis, is an acute disease characterized by intense fever, loss of consciousness, and embarrassed respiration. Its symptoms and post-mortem appearances are analogous to those of infectious diseases. Its onset is often sudden, as in cholera or plague, but usually it is preceded by premonitory symptoms, which indicate clearly a period of incubation. The frequent occurrence of relapses is another strong proof of parasitic nature. Like enteric fever and other infectious diseases, siriasis is closely connected with the hottest season; but—and this is a most important feature—it has a peculiar and restricted geographical distribution, which is not bound by isothermal lines, but, like that of yellow fever, is limited to a few coast districts, and to the valleys of some large rivers. Moreover, siriasis often prevails in epidemic form, and naturalization confers immunity to it, as it does to yellow fever.

All this may be very well, but theorists will not yield, and, not being able to offer any definite proof of their contention, they will tell you that the tropical climate induces deterioration. They remind me of squids and cuttle fish, which, being unable to fight their foes, cloud and darken the water with their ink as a means of defence. Most authors have mentioned a peculiar tropical deterioration,

but no one has ever described it in definite terms, because no one has ever seen it. Heat deterioration is a phantom that is vanishing rapidly in the light of modern science. Of course there are thousands of people within the tropics, both Europeans and natives, who show signs of bodily decline and of general debility, but in all these cases we can trace the deterioration to definite microbic processes. Deterioration in the tropics, as in Europe, is that condition of organic failure which is characteristic of long-continued (chronic) diseases such as tuberculosis and leprosy.

Two great causes of deterioration in tropical regions among Europeans are malaria and tuberculosis. Malarial diseases have a very wide distribution within the tropics, but their prevalence varies exceedingly in different regions. Some districts enjoy a complete immunity from malaria, notwithstanding the existence of climatic conditions which might be thought favourable to its prevalence. In others it is so greatly prevalent that the whole population suffers from malarial cachexia (chronic malaria). Tuberculosis is not a tropical disease, but it has been imported by Europeans to all colonies, and in some places it has become extremely prevalent. In the West Indies it causes now more deaths than any other disease, except dysentery. But most cases of tuberculosis amongst Europeans have not been contracted in the colony, but are outbursts of a latent infection contracted at home during childhood.

Deterioration is not limited to Europeans in tropical regions, but is equally prevalent among natives. The chief causes of deterioration among natives are leprosy, malaria, and tuberculosis; but the deterioration due to tuberculosis is far less prevalent than among Europeans, because in most places it is still rare, or confined to coast districts, and because when it attacks the natives it is rapidly fatal.

In Europe we find the same causes of deterioration, but with a very different prevalence. Malaria once prevailed extensively, but it has gradually disappeared, except in a few places, the chief of which are Southern Russia and certain parts of Italy. Leprosy was also prevalent in Europe as an endemic disease during the middle ages; now there remain only a few small centres, and even in these it is fast decreasing. On the other hand, we have the appalling deterioration caused by tuberculosis, rickets, and syphilis. The deterioration of the white man in his own climatic home has caused much discussion of late, and, indeed, it is deserving of urgent and serious consideration. Broad chests and powerful limbs are no longer common among labourers and artisans. The medical examiners of recruits reject a larger proportion every year, and those admitted into the ranks are certainly inferior to their predecessors. This deterioration is greatly favoured by the herding together of dense masses of population in large cities, a more strenuous struggle for existence, alcoholism, and immorality. In almost all nations, organic ruin is slowly progressing as the old country life is being merged into the miserable life of cities. The birth-rate in England, France, Germany, Holland, and Belgium shows a marked decline coincident with the increase of urban population; and, if we compare the mortality of the rustic labourer with that of the corresponding class in towns, we find that the countryman enjoys a life on an average three times as long as that of his metropolitan brother. Surely not over our colonies, but at the entrance of our cities, should be written Dante's inscription, "Lasciate ogni speranza, voi ch'entrate."

The present pessimism on the question of the tropical acclimatization of Europeans has a parallel in that which was so strongly expressed by Dr. Knox and others about the English transplanted to the United States and to Australia.

In studying the question of heat as a cause of disease, it will not be out of place to consider the influence of high temperature on workmen in Europe.

Carpenter, in his physiology, tells us that Chabert, the "Fire King," was in the habit of entering an oven the temperature of which was from 400° to 600° Fahr. Other examples equally surprising, and certainly less suspicious, are on record, but, however interesting, they are of little value to us, because such extremes of temperature can only be endured for a short time, and provided the air be dry. Far more important is the study of some of our workmen who toil day after day exposed to far greater heat than ever raged in a tropical settlement. Metal-casters, glass-blowers, stokers, men employed at Turkish baths, and labourers in certain mines, occupy certainly a low place in tables of vital statistics, but they don't seem to suffer in any special way from the heat. Their diseases are certainly not those prevalent in hot countries; they die chiefly from rheumatism and tuberculosis.

If the diseases of the tropics were due to meteorological agencies they would surely be especially prevalent amongst sailors; but we know, on the contrary, that tropical diseases are characteristically land affections. The crews of ships sailing in tropical latitudes are strikingly exempt from them. When they do occur among seamen they are found invariably to have been contracted on shore, or introduced on board ship by means of food, drinking-water, or other supplies. Of course some diseases, like yellow fever, malaria, siriasis, may be conveyed to ships through the air by means of insects or dust; but this usually occurs only at short distances, when they are anchored off unhealthy shores. Ships may become independent centres of disease, especially when infected by yellow fever or beri-beri; and they may then convey diseases from one country to another, and land them by means of their crews or their cargoes, and possibly by means of rats, which, finding their way into almost every ship, land on almost every shore.

In speaking of climate, we must not forget that between the tropics there is not one climate, but an infinity of climates. Hardly any two places a few miles apart have precisely the same climate. Climates do not depend on the geographical position of the district where observations are made, but are largely affected by a variety of conditions, such as distribution of land and water, nature of the soil and vegetation, elevation or depression, and character of the land at or adjacent to the place.

Now, this very local character of climate has been advocated to explain why tropical diseases differ in nature or prevalence in various regions, but it falls very wide of the mark. In all tropical regions each district maintains its natural peculiarities of climate year after year; if these peculiarities were the causes of disease, the yearly quotum of malaria, dysentery, cholera, yellow fever, etc., of different districts should vary with the intensity of these conditions. Yet statistics furnish no support to this necessary sequence; on the contrary, we see diseases diminish or increase in prevalence quite irrespective of climatic conditions. Enteric fever in India has lately become more prevalent; cholera and dysentery have greatly decreased. The introduction of new diseases, such as malaria, in the islands of Mauritius and Réunion, has spoilt regions which were previously healthy; on the other hand, sanitation has rendered salubrious regions which at one time were deadly.

In a paper published last year in the *British Medical Journal*, I endeavoured to show that it was not heat that opposed tropical colonization; but it is with living organisms, from man, wild beasts, and snakes to protozoa and bacteria, that we have to struggle for existence. In India about 23,000 people and 60,000 head of cattle are killed every year by snakes and wild beasts, but no one would dream of putting those deaths down to climate. In Australia, since the introduction of sheep and dogs, echinococcus disease has become greatly prevalent, but even in this case no one would attribute to climate the ravages of this worm. Why, then, should we make climate

responsible for the mortality caused by other organisms, even though they be the lowliest in the scale of life and invisible to the naked eye?

In some of the regions that the European has attempted to colonize he has found the native to be a fierce opponent, but the greatest, the longest struggle is always with the lowest forms of life. The most fearful arrow is that which is smeared with soil containing the bacillus of tetanus. In Equatorial Africa a fly (*Glossina morsitans*) drives man away from certain districts by killing his domestic animals, and its poison is the deadly parasite trypanosoma, which it inoculates. In the French expedition of 1896 to Madagascar, only seven men were killed by the Hovas, and ninety-four wounded; but the deaths due to pathogenic micro-organisms numbered 6000, while 15,000 men were on the sick-list. In the expedition of 1802 to Jamaica, the French lost no fewer than 50,000 out of 60,000 from the germ of yellow fever.

A knowledge of the distribution of tropical diseases is of the utmost importance in the study of colonization. Unfortunately, geographical pathology is as yet in its infancy. Pathogenic micro-organisms have their peculiar dissemination like all other forms of life, and their distribution is likewise determined by a number of circumstances. Amongst these, meteorological and soil conditions occupy certainly an important place, but the most important of all are association and competition with other living organisms.

Running through tropical pathology, as far as it is known, we are struck with the peculiar limitations which most diseases offer. Some have a very limited area: verruga seems confined to some valleys of the Peruvian Andes, negro lethargy is found only in the west of Africa, endemic hæmaturia has a very limited area of distribution in Africa and Mauritius, and even the germs of yellow fever, plague, cholera, and dengue have restricted endemic areas, though at times, under favourable circumstances, they seem to swarm like locusts, and spread in wide epidemics.

Round the main error that the tropical climate is deadly to Europeans, other superstitions have gathered; they are, that children cannot thrive in the tropics over five years of age, that white men cannot work, that their fertility is abolished, that they become extinguished within the third generation. At one time, of course, these statements seemed the most logical deductions of facts, now it seems almost absurd to discuss their fallacy.

It is not true that children cannot thrive in tropical countries. Thirty years ago, Sir Joseph Fayrer conclusively proved, from the experience of the Lawrence Orphanage, that, under proper management, children could thrive in India as well as in England, not only in the hill stations, but in the very plains of Bengal. The general opinion as to the unsuitability of a tropical climate for children over a certain age is derived mostly from Indian experience. I know full well that a number of European children brought up in India grow up slight, weedy, and delicate; but this is easily explained—they usually come from poor stock, principally soldiers' wives, whose health, mostly poor before leaving home, certainly does not improve in the country on account of ignorance and neglect. The children are often brought up in unhealthy districts and are very foolishly managed. For fear of diseases, wrongly attributed to solar influence, they are constantly shut up in stuffy and darkened houses. Under similar conditions, believe me, they would thrive no better in England. Surely those who lay so much stress on the weakly condition of European children in India have never seen the bandy-legged little monsters of Glasgow, or the sickly, miserable children that swarm in darkest London.

In considering the question of European children in tropical countries, we must not forget that infant mortality varies greatly in different colonies; that it is always

lower than that of native children; that in the most unhealthy regions it is lower than that of many districts in Europe; and lastly, that under improved sanitation it has fallen considerably.

The belief that the white man cannot work in the tropics arose greatly from the assertions of the advocates of coloured labour. It is certainly disproved by facts. Farm labour is carried on by white men in Central and South America, in tropical Australia, in South Africa, in the West Indies, and in India, with no worse consequences than in temperate regions. The malarious districts of the tropics are no worse than those of the temperate zone. In England, malaria has almost entirely disappeared, but in Italy it is still deadly to the labourers of the Roman Campagna and the ricefields of Lombardy. In India the farmer may be killed by cholera or be mutilated by leprosy; in England he is carried off by pneumonia or crippled by rheumatism. The turning up of a virgin soil in certain localities may be dangerous. Hong-Kong was especially unhealthy during the first years of occupation, when the ground was being cut up and levelled for building purposes, and it has been observed again and again in different countries, and sometimes in our large cities, that extensive disturbance of the soil in connection with canals and railroads may, perhaps by disturbing soil drainage, give opportunity to an outbreak of disease.

But, with the exception of low swampy districts, experience in all tropical regions has proved that white men are far more healthy when engaged in outdoor labour. The truth about the labour problem is that white men will not work; they go to the tropics with a fixed resolve to gain wealth by coloured labour, which only too often is another word for slave-labour. However, it is certain that Europeans will not work side by side with natives, and wherever coloured hands can be obtained, field labour is considered degrading and unworthy of the white race.

As to sterility, we find no direct evidence to prove it, but, on the contrary, we have many examples of continued and even increased fertility. Thus the Spaniards, who in their own country have a yearly birth-rate of 37 per 1000 inhabitants, have one of 41 at Cuba, and one of 46 in Algeria. The French offer a birth-rate of 26 at home, and one of 41 in Algeria.

It has been asserted that white men cannot exist longer than for three or four generations in the tropics. It is not easy to obtain facts in large numbers to disprove this statement, because in most places the time of occupation has not been long enough, and in others there has been more or less admixture of native blood or fresh blood from Europe has continually arrived throughout the period of settlement.

Sir Clements Markham, in a valuable paper which he read at the Seventh International Congress of Hygiene and Demography, gathered all the available information, much of which he had carefully collected himself, and proved that families of pure European blood had been settled for upwards of two centuries in places within the tropics, and that in each case the living representatives were quite equal to their progenitors in moral and physical development.

Not long ago, it was the general belief that each species of animal or plant had been created in the beginning in those very areas in which it is now found; but the principles of evolution have swept away these old preconceptions. We know now that the surface of the Earth has continually changed. Land has sunk beneath the ocean, fresh land has risen up from it destitute of land-life; mountains have been elevated, altered, crumbled; the physical conditions of districts have been modified again and again. Organic life has therefore been subject to continuous displacement and alteration. But, even independently of topographical changes, we know that plants and animals are continually altering their areas of distribution in the daily struggle for life. It is difficult to realize what changes have taken

place in the vegetation of Europe since the dawn of civilization. They must have been very great, but we have no complete history of them. It is otherwise with some of our colonies. Take New Zealand, for instance. Its native flora was investigated before it had been much disturbed by European immigration. The changes which have taken place during the short period of European occupation, are almost incredible: over five hundred species of exotic plants have become naturalized in New Zealand, and many have become so abundant in certain districts that they have displaced the native plants.

Some plants, when first introduced into a new country, seem unable to thrive, but we must not rush too hastily to the conclusion that the new climate is not suitable. If we could only know all the facts which bear on the case, we should probably find the reason to be a very different one. The red clover would not grow in New Zealand until bumble bees were introduced to fertilize its flowers; now it displaces the native grasses. Leguminous plants will not thrive in a soil which does not contain their peculiar nodule-bacteria. Botanists have sown the seeds of many hundreds of species of exotic hardy plants in what appeared to be the most favourable situations, but very few have ever become acclimatized. This proves that competition and association with other forms of life are far more efficient agencies in determining their distribution than the mere influence of climate.

What we have said of plants is equally true of animals. If we inquire into the origin of our domestic animals, we shall find that twelve of them came from Asia, two from Africa, and three from America, while only five are European. Again, we have successfully acclimatized in America and Australia those animals which had previously been acclimatized in Europe from Asia and Africa. There were no sheep in America and Australia, now their number is simply countless. Horses and cattle have thriven marvellously in South America. In New South Wales horses have turned wild, and have increased with alarming rapidity. The rabbit, introduced into Australia and New Zealand, and the sparrow in New Zealand and the United States, have grown into pests of appalling proportions.

Thousands of examples might be given from the animal world; the latest is, perhaps, the invasion of Europe by the brown rat from East Central Asia, which has practically expelled the black rat from Europe, just as the latter has been ejecting weaker rodents from South America.

Thus we see not only that plants and animals can become naturalized in other climates, but that they have often prospered better in the new environment than in that of their original habitat, altogether disproving the old theory that each species occupies those districts and surroundings best suited to its life.

Turning to man, we find that anthropologists have divided mankind into several races, which, according to individual authors, have varied from three (Cuvier) to fifteen (Bory de St. Vincent). These races were formerly considered quite distinct ethnic groups, and were believed to have originated independently of each other; but now the unity of the human species has become an accepted fact, and we again believe, as Hippocrates did two thousand years ago, that "races are the daughters of climates."

Man, anatomically and physiologically a mammal, is subject to the same laws which govern all other forms of life, and therefore he must have had a restricted primitive area. To suppose that he appeared in the beginning, everywhere that we now see him, would be to make him a unique exception; and, in the absence of direct proof, we should have to deny it. However, it is an undisputed fact that widespread migration and consequent acclimatization have taken place in all times, and the researches of ethnologists to-day are continually bringing new evidence.

The whole history of mankind is one of invasions and displacements, one restless

movement of individuals and masses. The swarms of colonies thrown out by Phœnicia and Ancient Greece, the Slavonic and Teutonic flood which swamped the Roman empire in the fifth and sixth centuries of our era, and the wanderings of the vast Mongolian hordes in more recent times, are good examples. These migrations followed in every possible direction along the lines of least resistance, generally along river-valleys and across the lowest mountain passes. They moved very rarely northward, and only under the irresistible pressure of stronger neighbours. Often they followed the parallels of latitude, but mostly they tended in a southward direction to warmer and richer regions. The emigrants usually settled in climates not greatly different from that to which they were accustomed, but there are exceptions: the Vandals settled in North Africa.

In following up the evolution of some of the swarms of men which settled a few centuries ago far from their ancient seats, we find that they have fallen under the same laws which govern the dispersion of all organic beings; thus, according to circumstances more or less favourable, while some people have totally disappeared, others have continued to exist. Of the latter, some have been greatly transformed by the new conditions of life, and by mixing and crossing with local people, others have hardly changed, and have succeeded so well that they have assimilated, displaced, or pushed wholly out of existence the former occupants. Thus in India, while the Rohillas, the Rajpoots, and the Parsees of Aryan race have remained unchanged after centuries, the Portuguese of Bombay and Goa have altered immensely, and are now as black as Kohls or Bhils.

Now, if Aryans of remote immigration have not only been able to thrive, but have even absorbed the semitic dwellers of India, why should the Aryan of to-day be unable to colonize even those parts of the great peninsula which have been called "the English climates of India"?

The French thought at one time that they would never be able to thrive in Algeria, although descendants of anciently immigrated Aryans are still to be found in the province of Constantine and all along the Atlas from Mount Aures to Morocco. The climate of Algeria was considered deadly to Europeans. General Buvivier declared "que les cimetierès sont les seules colonies toujours croissantes en Algerie." Now we send invalids to Algeria, many of its places having obtained the reputation of excellent sanitaria!

The Red Indian inhabits the frozen wastes of Hudson bay and the hottest regions of tropical America. In the Republic of Ecuador, he thrives at a height of 12,000 feet on the Andes, and in the low plains at their western base. But if the red man can do this, why should it be impossible to the white man, who certainly has greater facilities of accommodation? The Jews have succeeded admirably in climates very different from that of their native land. They thrive just as well in Poland as in South Africa. The Spaniards and Portuguese have become completely naturalized in some of the hottest parts of South America. The death-rate of the Spaniards in Cuba is less than in Spain.

The Dutch have prospered in South Africa and in the Moluccas. At the Cape, where they have been settled and nearly isolated for about two hundred years, they have hardly changed. They are fair, tall, and robust. Indeed, they are the finest men in South Africa.

It has been often repeated that the southern European nations stand a better chance than the northern ones in the colonization of tropical lands. Prof. Virchow suggested that the reason might be a certain amount of semitic blood, and Dr. Felkin the greater proximity of their home to the tropical zone; but the south Europeans can not only endure more heat, but also greater cold. It was remarked by the famous Larrey, that in Napoleon's campaigns, whether in that of 1806–7 or

the later disastrous one of 1812, the troops which endured the cold best were not the northern ones, but the southern, such as the Spaniards, Italians, and southern French.

I believe that the greater adaptability of southern Europeans is mostly due to influence of national habits. The Italians, the Spaniards, the Portuguese, like the Irish, the Jews, the Chinese, show a great facility of accommodation by reason of their frugality and perseverance.

The most important, the essential condition of acclimatisation is the acquirement of immunity against new diseases. It is the general belief, in all tropical countries, that new arrivals must pass through an attack of a seemingly specific fever which is supposed to be essential to acclimatization. I need not point to the absurdity of this statement, but it is certainly true that new arrivals are far more susceptible to the peculiar diseases of a place than the natives or old residents, and this is especially so in reference to siriasis and yellow fever. At Vera Cruz, the magnitude of an epidemic of yellow fever depends entirely on the number of new arrivals.

New arrivals show towards the diseases of a new place the same susceptibility that the natives show towards a newly introduced disease.

A great deal has been written about racial immunity, and that of the coloured races from malaria was once considered as an indisputable fact. More recent observations have proved that differences are usually small, and mostly unfavourable to the natives. On the other hand, it is frequently stated that the dark races are more liable to elephantiasis than the white. This is undoubtedly true in some countries in which Europeans live a more hygienic life, and are more careful about the water they drink. But when whites assume the habits of the natives, they are quite as liable to acquire elephantiasis, as Indian and Brazilian experience has proved.

We know as yet nothing positive as to the mechanism of immunity, and it is certainly not correct to state indiscriminately that it can be transmitted by heredity. Facts from experiments are mostly adverse, and moreover, of the diseases which confer immunity, it would be difficult to name one in which a second attack might not occur. Much of the immunity of natives is only apparent, because we must not forget that those we meet are the survivors. Therefore, I believe we can safely state that the immunity of the native is not a natural (racial) but an acquired immunity, and that the colonizer can acquire it just as well.

To acquire immunity, it is not necessary to suffer the disease in its full development. Laboratory experiments have shown us that the inoculations of small quantities of bacteria, though not producing all the symptoms of the disease, nevertheless confer immunity to subsequent more abundant inoculations, which, if practised in the first instance, would have produced the disease in its worst form and caused death. The same happens in nature. We are constantly struggling against disease germs, and we acquire immunity against them without even being conscious of having been attacked. Sanitation, preventing the swarming of pathogenic germs, by the maintenance of conditions unfavourable to their development, will greatly reduce the possibility of overwhelming attacks.

Authors generally maintain that sudden transference to an extreme climate is unfavourable to acclimatization. The ancient migrations of primitive people were necessarily accomplished step by step, and the wanderers accommodated themselves gradually to surroundings which differed but little from those they had previously left. We proceed in a very different way: our railways and steamers transfer us in a few weeks to distances which in old days would have cost centuries. It is only in a few savage tribes that progressive colonization is still witnessed.

Progressive colonization would be impossible nowadays to European emigrants; but if it were possible it would certainly not be preferred. And, in fact, what are the losses in our system of colonization compared with those of the past? The primitive migrations are not recorded by history, but by analogy we may easily imagine how millions of individuals were hurled to destruction in their desperate struggle with men and surroundings. Every step was a battle. The Kalmouks, in their exodus of 1771, were over 600,000 when they left the Volga, but, five months later, only 350,000 reached the frontiers of China. In the present day we transfer shiploads of emigrants to any part of the world with hardly a single loss, but we land amongst them a host of weaklings. In the old perilous migrations of people, only a small minority ever reached the promised land; but they were the survivors of the fittest. This was the secret of their success.

A question of the greatest importance in colonization is that of racial intermarriage. Crossing with native stock or with immigrants better adapted to the new environment is considered by many as the best and most rapid mode of securing acclimatization. Intermarriage is said to be the secret of Spanish and Portuguese success in Mexico and in the Philippines.

Race-crossing is certainly present in all colonial populations. Considering only the half-breeds which have resulted from the intercrossing of the white race with the coloured ones, we find that there are over 18,000,000. It is a natural process, which, by gradually blending varieties, tends to unity of character.

But intercrossing is by no means essential to acclimatization. Half-breeds resist no better than pure whites in unhealthy colonies. The Portuguese who intermarried in India with the native women have been almost entirely absorbed; on the other hand, the most successful examples of naturalization have occurred where there has been a complete absence of crossing, as among the Jews in the Bourbon islands and the Boers in South Africa.

The native problem is a very difficult one. Two distinct races, to whom intermarriage and social equality would be impossible, cannot subsist side by side. The struggle between the white man and the aborigines of America and Australia is an example. Our pioneers showed themselves cruel, treacherous, merciless. The natives were shot down like wild beasts or poisoned by strychnine. Small-pox was purposely disseminated amongst them, and in New England, so late as 1756, the government paid money for Indians' heads. It is a cruel page in the history of mankind, but such is the struggle for life.

In sketching the various facts which bear on the problem of colonization, I hope I have succeeded in proving how unimportant are meteorological agencies in themselves. I do not mean to say that heat and moisture have no direct influence on our well-being, because certainly they have. But we have two strong means of protection against meteorological agencies. One is that wonderful process of organic adaptation, which can change into hair the wool of European sheep imported to the West Indies or to the west coast of Africa; the other is advancing civilization, which has almost freed us from the bonds of nature.

The true obstacles to colonization are the multitudinous living mites which team in the tropics like every other form of life. Against these nature can only give us fair play; they are her creatures as much as ourselves. But we worship Science, and that goddess will surely lead us to victory.

The almost incredible reduction in mortality obtained in all tropical colonies through improved sanitation, shows that the diseases of the tropics are greatly under our own control. But what has been the sanitation of the past? A blind application of measures which had proved useful against other diseases in our own climates.

To act efficiently in the prevention of diseases, we must have a thorough knowledge of the parasites which induce them; we must know their areas of distribution, their extra-corporeal habitat, the conditions favourable to their development, the means by which they are conveyed to man. A great deal has already been achieved in tropical pathology by a host of noble workers, such as Pasteur, Koch, Laveran, Hansen, Manson, Kitasato, Bruce, Sanarelli, but a great deal more remains to be accomplished. There are numberless diseases in the tropics of which we know nothing, except that they kill. The young practitioner generally goes out to the colonies with only a limited knowledge of the diseases most common in Europe, unprovided with means of scientific research or totally unfit to pursue it. Whatever he sees there he groups round the few familiar types. What matters if there are striking differences? he will easily explain them by the special climatic influences of the locality. A favourite expression of Indian medical reports is that "malaria dominates the pathology of the region." In such reports, relapsing fever is malaria, blackwater fever is malaria, typhoid fever is malaria, and so are other diseases.

If attempts at colonization in the past have often been unsuccessful, if they have always cost immense sacrifices in lives and money, it is because they were made in complete ignorance of the conditions essential to success. I hope that this afternoon's discussion may finally extricate the question of tropical colonization from the old exploded theories, and place it on the sound basis of modern scientific knowledge. It would be ridiculous to continue further to dispute the possibility of tropical colonization, now that over ten million white men and their descendants are already settled within the tropics, laying the foundations of new and perhaps greater civilizations.

Before the reading of the paper, the Chairman, Sir JOHN KIRK, said: The President regrets very much being unable to attend, being still indisposed; he has asked me, therefore, if I will take his place on this occasion. The subject announced for discussion will be introduced to you by Dr. Sambon, who has had great opportunities of studying the question of acclimatization of white men in tropical Africa. I will ask him now to give us an account of his views on the subject.

After the reading of the paper, the following discussion took place:—

Dr. PATRICK MANSON said: I have prepared a few remarks on the subject of this discussion, but before reading them, I express my astonishment at the wonderful similarity between the observations I make here and those that Dr. Sambon has already given expression to—a fact, it seems to me, which goes a long way to prove the truth of his statements and deductions.

In former years, under the influence of early teaching, I shared in the pessimistic opinions then current about tropical colonization by the white races. In recent years, however, my views on this subject have undergone a complete revolution. This revolution began with the establishment of the germ theory of disease; it gathered force as, one after another, the great disease scourges of mankind, of beasts, and of plants were proved to be caused by living organisms; and it was complete when I had personally convinced myself that Laveran's immortal discovery of the protozoal germ of malaria was indeed a fact. I now firmly believe in the possibility of tropical colonization by the white races. Its practicability has already been proved for many countries. I believe the time will come when it will be proved for all countries; theoretically it is already proved, but how long we shall have to wait for the practical proof, I cannot pretend to say. Its postponement is entirely a matter depending, in the first place, on the growth of knowledge,

and in the second, on the general assimilation and common-sense application of this knowledge. Knowledge in this department of science is advancing very rapidly, so rapidly that I think we cannot have many more years to wait.

To state fully the grounds of my beliefs in this matter would only be to recapitulate the facts and arguments Dr. Sambon has so ably advanced. The gist of the situation is simply this. Heat and moisture are not in themselves the direct cause of any important tropical disease. The direct causes of ninety-nine per cent. of these diseases are germs; that is to say, plants and animals—plants and animals with tropical requirements. So long as it was believed that the peculiar meteorological conditions were the direct cause of the unhealthiness of the tropics, so long did it seem impossible to secure health there, for we cannot materially influence the weather. But now that we know that the unhealthiness of the tropics depends on the plants and animals of the tropics—the pathological fauna and flora, the position becomes much more hopeful. For what known plant or animal is there that man, in virtue of his intellect, cannot slay or protect himself against, provided he knows what it is and where it is. To contend with them successfully, we must know these plants and animals, and we must understand their habits and their vulnerable points. To know our enemy is the first step to conquest. We do begin to know something about our tropical pathological enemies. When we know them and their habits fully, then victory is within our grasp; we need only to apply the knowledge to secure it.

Most diseases are caused by parasites. Unfortunately, most parasites, when they have got below the surface of the body, whether it be the epidermis covering the body or the epithelium lining the mucous tracts, are safe. We may, to some extent, by drugs and other means, hamper them a little when thus fairly lodged; in no instances, however, can we under such circumstances be sure of killing them outright. But these same parasites, from their very nature and in order that their respective species may keep in existence by spreading from one host to another, must at some time or another leave the human body. Thus it comes about that they have perforce to live for a longer or shorter space in outer nature. During this necessary extra-corporeal state they are exceedingly helpless and eminently vulnerable. Herein lies our opportunity. To kill them then is simply a matter of knowledge and the application of this knowledge—sanitary science and sanitation, in fact.

Perhaps this fundamental principle of sanitation is best brought home by an illustration. Let me make use of an illustration drawn from tropical pathology. You will pardon me if I select one with which opportunity and study have made me specially familiar.

In nearly all tropical countries, a large proportion of the inhabitants—in some places ten per cent., in other places up to seventy-five per cent.—harbour one or other of the four or five species of blood-worms now known to occur in man. Some of these blood-worms give rise to grave disease—that hideous disease, very appropriately named elephantiasis, for example. Now, in order to prevent this disease and allied affections, all that is necessary is to keep the cause, the blood-worms referred to, from entering the human body. How can this be done? Simply by acting on the knowledge we possess of the life-habits of those blood-worms during that extra-corporeal and vulnerable phase to which I have alluded, and which is common to all parasites. It so happens that we know, in the case of this particular blood-worm, what this extra-corporeal phase is and where it is passed. We know that every evening these worms are carried by the blood-stream to the surface of the body. We know that certain species of mosquito, when they imbibe the blood, swallow with it the floating worms it contains. We know that these ingested worms, leaving the stomach of the mosquito, enter the thoracic muscles of the insect and therein

undergo a wonderful metamorphosis, a metamorphosis which in due course qualifies them for living as free animals in water. We know that when the mosquito dies, which she does soon after laying her eggs, she falls into the water on which these eggs are deposited; and we know that the blood-worms she contains escape from her dead body and swim about in water as free animals. And we believe, I might say we know, that when man inadvertently drinks this water he swallows the blood-worms, which then pass from his stomach to his tissues, and so start a new colony of blood-worms, and very possibly grave disease. Now, from this piece of knowledge, it is easy to prescribe a dozen simple ways of preventing blood-worm diseases—elephantiasis, for example. We have but to keep the mosquitos down—not a very difficult matter if we set about it the right way; or we have to prevent, by simple means, the mosquitos from preying on already infected individuals; or we have to keep the mosquitos from getting access to our drinking-water; or we have to kill, by boiling or filtration, the larval blood-worms which our drinking-water may contain. Knowledge of the facts of the life history of these blood-worms, that they are conveyed to man by the mosquito through drinking-water, at once indicates simple and thoroughly effective preventive measures. No one now need suffer from elephantiasis.

I could quote other instances of tropical disease in regard to which knowledge of the life-history of the germ confers on man an absolute power of prevention, a power, moreover, easily given effect to. There is a weak and unprotected point in the life-history of every parasite, and on which, did we but know where it lies, man can place his finger and stay disease.

I wish I could indicate with precision this weak point for the malaria parasite, that germ which, *par excellence*, renders the tropics in many places so deadly, and which is, in fact, the main obstacle of the successful colonization of the tropics by white races. There are signs, however, that the day of deliverance from this worst curse of mankind is at hand. Fact after fact is coming to light about the malaria germ, and step by step we are approaching that complete knowledge of its life-history which alone will enable us to crush out this terrible parasite, or, at all events, to protect ourselves from its attacks. This consummation has been unnecessarily long in coming, thanks to indifference to our true interests and duties. Is it not a strange thing that, though thousands of men can be got to toil unceasingly, to undergo endless fatigue, privation, and danger, to expend brain and muscle and money, merely to unearth some handfuls of yellow dirt or some glittering pebble, yet for this grand work of attaining the knowledge by which we may cope with the malaria beast, so few labourers and such meagre means are forthcoming? I do not believe that in all the world at the present moment there are a dozen men actively engaged in strenuous endeavour to work out the malaria problem, notwithstanding its enormous importance, an importance compared to which the greatest war is as nothing. And yet the problem is not a hopeless one, for, given adequate means and opportunities, its solution is by no means an impossible matter. I think it was Carlyle who said, that if the time and care and effort devoted to the training and turning out of one ballet girl were but devoted to the Irish question, that troublesome political bugbear would be quickly settled. The same might be said of that much greater, much more important problem—the malaria problem.

The successful colonization of tropical lands is entirely a matter of knowledge, and of the application of knowledge. This the Royal Geographical Society, so long the pioneer in scientific tropical travel, cannot fail to appreciate. We may be assured of its sympathy and encouragement in any project having for its object the betterment of the health of the traveller and the colonist in tropical lands. This reflection encourages me to mention that at the present moment some of us are

trying to establish, in connection with that neglected field for the investigation and study of tropical disease—the hospitals and dispensaries of the Seamen's Hospital Society—a school for the practical training of medical men proposing to practise their profession in our tropical colonies. Surely a laudable object, and one which, more than anything I know, would provide us, if carried into effect, with trained investigators capable of advancing our knowledge of tropical disease, and of spreading that knowledge. Yet such is the indifference of the public to this a public duty, that our scheme hangs fire, merely for the want of a few thousand pounds. It languishes in a country whose sons yearly die by thousands from tropical parasites; in a country whose unexampled prosperity is owing to, and depends in great measure on, tropical countries. And yet we are so rich that the Chancellor of the Exchequer does not know what to do with his surplus millions. Worthy objects of benevolence are so scarce, apparently, that the rich have to fall back on starving cats, homeless dogs, and broken-down horses. I wish some of these rich men, conscious of the responsibility of wealth, would recognize that the attainment of a scientific knowledge of the many unsolved tropical-disease problems is a far worthier object for their beneficence than any number of cats or dogs or horses. A few of their surplus thousands would go a long way towards solving the problems of the colonization of the tropics by the white races.

The CHAIRMAN: Perhaps Sir Harry Johnston, who has studied this question on the spot in the tropics, will be able to make some remarks upon the position of Europeans in respect to colonization such as he has observed it in these countries.

Sir HARRY JOHNSTON: My general conclusions, I imagine, are quite those of the reader of this very interesting paper; that one should distinguish as a general rule between the effects of climate and the effects of what I suppose is due to soil and other local conditions independent of, to a great extent, though perhaps created by, the climate. At the same time I think this theory, like other theories, must not be pushed too far. It has often been remarked to me by Europeans in Central Africa, and I have said it over and over again myself, "What a delicious climate, but what a cruelly unhealthy place!" There are many parts of Africa where the climate is disagreeable, where great heat and moisture are combined at the same time; but in much of the interior of Africa, as the Chairman of this meeting knows perhaps better than most people, the climate is delicious. In Dr. Livingstone's book on the Zambezi expedition he remarks, and quotes the remarks of several naval officers, that the climate "is like that of Italy." But I take it that there are germs in the soil—I have often thought perhaps it is because of the land having lain fallow so long, never having been chastened by tillage—there are germs in the soil and water which are peculiarly fatal to Europeans, and which to some extent are also harmful to the indigenous inhabitants of the country. Yet, as I say, the theory must not be pushed too far, because there are many parts of the tropics where the climate causes not only ill health in Europeans who go out for temporary purposes, but also a certain deterioration in the children born there. I have visited India for a few months only, but I confess I came away with the impression that the bulk of those Britons pointed out to me as having been born and brought up there did not strike me as reaching the same high physical and mental standard as those other of their fellow-countrymen who had been born in the United Kingdom. We have not been connected sufficiently long with India yet to be able to speak decidedly on the subject. The number of generations is very limited; but still, although I should certainly be averse to opposing the idea that eventually in tropical countries a European race might take root, I think it would be an inferior race. If we look at the history of the world, we find the great races do not seem to be produced in tropical countries. In most parts of

Australia I am prepared to admit that, owing to the greater dryness of the climate, the heat alone is possibly not an obstacle to successful European colonization without degeneration; but I confess I am unable to give up the idea, much as I should like to do so politically, that in most tropical countries the European settlement of the country would tend to the eventual production of a slightly, and possibly greatly, inferior race. However, it seems to me for practical purposes we need hardly discuss matters so very far ahead, because most tropical countries contain a very abundant native population, and there are obstacles from that reason alone, such as the great competition which would ensue, and our modern ideas of forbearance to our fellow-men of all colours, which make us refrain from pushing those people out of the way to provide room for European colonists. That need will only come when some supreme exigency forces Europeans to set right aside and replace it by might. What we do want is the knowledge of how a limited number of Europeans may *rule* the tropics, because so inferior are all indigenous tropical races that there scarcely remains a single tropical country which is independent politically, or whose independence is not more or less threatened. What we desire to find out is how, without unreasonable loss of life, our fellow-countrymen can govern tropical regions. In some parts of Africa the loss of life is not so alarming; but take British Central Africa—the loss of life there is so great that the gains scarcely balance it, but we have such hope for the future that we are afraid to give in. Therefore, if we could solve the problem of how to live in such a country in reasonable health, the gains, politically and commercially, would be so enormous that we might put aside for the moment the question of whether European races can wholly replace the existing people of the country.

To narrow the issues still further, there are only three diseases we have to combat in Central Africa—they are common malarial fever, and then, in an ascending scale, dysentery, and either yellow fever or black-water fever. I think the problem of how to maintain existence for a reasonable term of years has been practically solved in India. The average health of our fellow-countrymen in India is so good that we can set that question aside as settled. It is so, also, in Ceylon, and likewise in most parts of tropical Asia. But in Central Africa the loss of life is, and will remain for some time, very serious indeed from those three diseases—ordinary malaria, dysentery, and black-water fever. I quite agree with the general tenour of the lecturer's remarks, that these diseases do not spring from climatic effects, but from germs. If we could combat those germs, we should remove the terror that attends visiting those countries. But even in quinine we have found no prophylactic. Quinine cures individual attacks of malarial fever, but the constant taking of quinine does not in the least prevent a man incurring malarial fever, and he may end by suffering from too much quinine. On dysentery it has a less marked effect, and on black-water fever it has no effect at all. We know scarcely anything at present of how to extirpate or neutralize the germs of those three great diseases. As that alone is such a gigantic task, we should obtain better results by applying ourselves first to this practical end rather than to the much vaguer and more distant problem of whether European races will ever be able to colonize tropical countries.

Mr. J. A. Baines: I did not expect to be called upon to say anything, because the lecture has taken such a scientific form that I feel I can hardly add anything to the discussion. I have, however, spent about twenty years in tropical countries, and have studied the general question of the acclimatization of different races, mostly in India. I have also taken occasion to learn what I could of the mixed races in South America, particularly the Spanish. I cannot say I agree entirely with the deductions of the lecturer as to the success with which these experiments have

been attended. Of course I regard the word "acclimatization" in the sense in which Sir Harry Johnston regards it, that a race must not only live, but be able to reproduce itself quite as efficiently as it does in its own country. If we colonize at all, we do not want to degenerate, but we want to have the same capacity that we enjoy in our own country. Looking at it in that way, the little attempts at acclimatization in India have absolutely failed. I quite agree with Sir Harry Johnston that the country-born British there are excellent people in their way, but both physically and in character they are decidedly below the young men we get imported fresh from England, who serve their generation and go back to their own country without any idea of settling or colonizing. I also agree with what has been said about children. Children, if kept in the tropics, even in the best of highland climates, degenerate after a certain time, and very often come home outgrown physically, and certainly not of the same mental capacity as their compeers at school here. I think the lecturer mentioned the Portuguese. The Portuguese of the west coast of India contain no blood of the Portuguese race at all. A large number of people in the British districts around Bombay have Portuguese names because the people who converted them happened to be Portuguese bearing those names; they won't call themselves Portuguese, but native Christians. The natives of Goa are no more Portuguese than any of the Hindus. On the East Coast of Africa I think there has been undeniable intermixing. The Portuguese habit there has been to intermarry with the native races to such an extent that there is little real Portuguese blood left, and what is called Portuguese is decidedly mixed. If we go back to Europe, I think any one who knows Portugal would say the upper class people are by no means of the same purity of blood as we find amongst the Spaniards or other Latin races. There is a decided mixture among them of Semitic blood, whilst, on the other hand, amongst the peasantry you can find marked traces of their Gothic ancestry. As to South America, I do not agree that the Spanish race in the tropics there has continued either in its efficiency or purity. The Spaniard of America is of a very different sort from the Spaniard of Spain. I must say we have heard a great deal of theory from the speaker behind me, but the question, as it appears to me, exists at present in the region of theory only. All the experiments that have been tried have not led us to believe that they will be successful in raising up a white race in the tropics that will keep up to the European standard of efficiency.

Dr. FELKIN: I should like to say one or two words, although several points to which I intended to refer have already been touched upon. I think that Dr. Sambon should place a limit as to the time when this acclimatization is to take place. If we are to infer from his paper that acclimatization is immediately possible, I do not agree with him; if he means in the distant future, say in four or five hundred years, there is no reason why we should not look forward to acclimatization by Europeans being possible anywhere at that date. In the present condition of our knowledge, I do not think we can contemplate with complacency any attempt to settle a large number of Britons in tropical regions. We can only expect great loss of life and suffering, and the survival of a very few. It is perfectly true, as the reader of the paper remarked, that the inhabitants of the tropics have, in time, passed towards the north, and it is theoretically possible for the inhabitants of the north eventually to regain possession of tropical lands. But I do not think any of us will ever live to see that day, and I cannot help regarding Dr. Sambon's opinions as rather dangerous, unless qualified by a time limit. If we grant that the cradle of mankind was in a tropical centre, from whence man overspread the world, we must not forget that the migration which took place occupied many centuries, and was, as we know, attended by enormous loss of life, only the fittest surviving. In

my view of the matter, notwithstanding the advance of sanitation and personal hygiene, a considerable period must elapse before the reverse process could take place, and the inhabitants of temperate regions re-occupy and become acclimatized in the tropics.

I certainly think the paper ought to do a great deal of good in stimulating research with regard to tropical diseases, and also in influencing the public to acknowledge their duties with regard to the education of medical men proceeding to the tropics. Of course, malaria and other diseases, to which reference has been made, are not fully understood at present, and a thorough investigation of them is essential; and as to the need of a special education before going out to tropical regions, there is no doubt of its importance. I do not mean that this training or teaching can do more than help towards making acclimatization possible—far from it; theoretical teaching and practice are frequently hard to reconcile. In the rough and tumble of life, a man cannot take all the precautions which he knows are advisable, and accidents are therefore inevitable. Still, fore-warned is fore-armed all the world over, and very much is gained by being prepared beforehand. I was only reading this morning that many years ago Max Müller tried to make Macaulay see that Great Britain, which had the largest oriental empire in the world, ought to have a school for teaching oriental languages, just as France, Italy, Germany, Austria, and Russia, had and have. Now we see that these governments are reaping their reward. It is just the same with the knowledge of climatology and tropical diseases. On the continent great attention is given to the subject, and they will have their reward; in this country we let things slide, and we too shall meet the consequences.

Theoretically, acclimatization may be possible, but I do not think that at present it comes within the region of practical politics.

Mr. Alfred Sharpe: Having lived for the last ten years in Central Africa, I cannot, of course, fail to have formed opinions on the question that has been discussed to-day, and it seems to me that we can theorize as much as we like on this subject, but the fact remains that Europeans continue to die there. The death-rate is very high; and, do what we may, we cannot, as yet, prevent it. There is one point which struck me in the interesting paper which Dr. Sambon read, and that is that he spoke of "heat." I do not know that "heat" has anything to do with unhealthiness in tropical countries at all. The whole question is malaria, so far as Africa is concerned; there is greater heat in Australia than in Central Africa. As Sir Harry Johnston has said, as far as Central Africa is concerned, there are three serious complaints, and if the doctors can find some means either to enable us to prevent those fevers coming or to minimize their effect, then they will have achieved much. It is, in my opinion, impossible for colonists (in the sense of permanent settlers) to do much in Central Africa until we find some means of preventing or curing malaria.

The Chairman: I think you will wish me to convey to Dr. Sambon your thanks for the able paper he has read, which has given rise to so interesting a discussion. We have heard two views expressed; the first is that which Dr. Sambon advocates, that we have the means of getting rid—if we would only study the subject—of all the difficulties that stand in the way of the colonization by Europeans of tropical countries; the other, that we are a long way off from that result as yet. My experience in Africa has shown me that, apart from the question of health, the white man has to compete with the black man in tropical countries on unequal terms. The black man is the best, because the cheapest, labourer in tropical countries, and I do not see that the white man can ever colonize in face of the black man so as to supplant the latter for unskilled work. The black man needs some

one to guide him, but with such guidance he will always work better, and do more work in the tropics than the white man could do there; so far, therefore, as my experience goes, we can, for the present, only look, as Sir Harry Johnston says, to organizing a governing European class that will rule and guide the black man. Under such rule, whenever it has been applied, we see the black man increasing so rapidly, that the white man would have no chance at all. We know that in America the Spanish race has degenerated, and in India the Goanese have now little or no Portuguese blood in them whatever. I will, if you will allow me, now thank Dr. Sambon for his interesting paper.

Mr. J. W. Wells: There is one thing I should like to call attention to which seems not to have been noticed in the discussion, and that is the fact that many delicately constituted children become adults in a tropical climate, who in this country would probably never have reached that stage at all. I maintain that the English race, in its days of childhood, has to endure such a series of rapidly changing temperatures and climatic variations, that a Britisher is tempered to live anywhere. An American replied, when he was asked about our climate, "You have not a climate, but you have quite a quantity of samples, and I do not wonder, that provided you can live through these samples, why you can just live anywhere and populate the world." My conviction is that many of the feebly constituted children born, and attaining manhood, in tropical climates, if born and reared in this country, would have ceased to exist at an early age. The consequence is that, in the majority of tropical regions, the existence of feebly constituted inhabitants is rather due to the amenities of the climate rather than as one of its detrimental effects. The British race is an example of the survival of the fittest.

The following letter has been received from Colonel J. C. Gore, Colonial Secretary of Sierra Leone:—

"Dear Sir,—I regret to say that the notice of the meeting of the 27th instant only reached me on the afternoon of that day. After twenty-five years' experience of the climate of West Africa, I am of opinion that Europeans do not become acclimatized. The only advantage old residents have over new-comers is that they know better the dangers to avoid, and the best means to take in that direction. I consider that an old resident in West Africa is just as likely to be carried off from a bad attack of fever as is one who has just arrived; in fact, the odds are rather in favour of the new-comer, as he is likely to be in better condition. It is a well-known fact that a person who has once had an attack of so-called black-water fever is more liable to have another attack when subjected to the same influences, and that each attack increases the risk he runs when returning to West Africa. I am strongly of opinion that, when once a person has had this disease, he should not be allowed to return to the West Coast. Acclimatization may be possible in other tropical countries, but West Africa is exceptional. I am very much interested in the question naturally, as I am still serving on the West Coast of Africa. I attribute my escape from the effects of the climate *to great good fortune*, and, of course, being very careful in my living."

SURVEY OF INDIA REPORT.

The report of the Survey of India under review ends with the summer season of 1897. It is consequently rather more than a year old. Why it should be so late in publication is nowhere explained in the body of the report. It was a season of steady hard work and satisfactory progress in all branches of the department, with

none of the lighter incidents of campaigns or political missions to break its level monotony.

There is now but one trigonometrical party in the field, and the field of its operations is not an easy one. It is slowly pushing its way westward from the Indus through the already surveyed districts of Southern Baluchistan, in order to strengthen the original triangulation of that part of the frontier, and to give the basis for further extensions. This is the series which may one day unite the geodetic triangulations of Russia and India. The disasters which attended it last winter, when it was temporarily withdrawn from the field, form, of course, no part of the present report. Six parties took the field for topographical duty, and between them completed 14,460 square miles of topographical mapping. A large part of this area is in Upper Burmah, in the wild and jungly Shan states west of the Salween, and includes much of the country through which the now half-completed railway from Mandalay to the Kun Long ferry on the Salween is carried. The new topographical survey of Sind is progressing well, as well as that of the Himalayan states. It is curious that the districts immediately surrounding Simla should have waited so long for representation on the 2-inch scale. The Baluchistan topographical survey is practically finished, but the party will be well occupied in future with Sind topography and with the extension of north-west frontier surveys and reconnaissance generally, retaining its headquarters at Quetta. Several of the native members of this party have been temporarily transferred for service in Africa, and it is gratifying to learn from other sources than this report that their work has been greatly appreciated by the administrative authorities. The total outturn of forest surveys on various scales (from 2 inches to 16 inches) is 4825 square miles, of which 1563 were surveyed by the Forest Survey branch of the department. It is, we believe, probable that all the Imperial Forest Surveys will be brought under the administration of the surveyor-general ere long. Cadastral surveys amount to 7190 square miles of outturn on scales varying from 8 inches to 24 inches per mile, and they include by far the largest share of the survey programme in Upper Burmah and Bengal. In the latter province famine seriously interfered with progress. In addition to the above (which may be regarded as normal departmental business) special operations were conducted for latitude determination in Madras, fixing the value of the Madras observatory at 13° 4′ 8″·02 N. lat. Tidal observations and spirit-leveling are also included under the special head. The outturn for geographical survey and reconnaissance amounts to 78,718 square miles, of which 11,718 are credited to Burmah parties in the report, the balance presumably being on the north-west frontier. With all this mass of fresh material, the headquarters office at Calcutta, as well as the drawing-office at Simla, which especially deals with frontier mapping, has been kept well occupied in map-reproduction. Thus it must have been with regret mixed with considerable inconvenience that the surveyor-general parted with two such capable assistants as Colonel Waterhouse (whose reputation spreads far beyond India) and Colonel Rogers, from his office. But the laws of compulsory retirement at a fixed age know no relaxation except in favour of departmental heads. On the whole the Survey Department is to be congratulated on a successful year's work.

THE MONTHLY RECORD.

EUROPE.

Physical Geography of the Maritime Alps.—Dr. Fritz Mader makes an important contribution to physiographical literature in the booklet recently published by Gustav Fock, in Leipzig, on 'Die höchsten Teile der Seealpen und der

Ligurischen Alpen in physiographischen Beziehung.' An exhaustive account of the geography of the Maritime Alps is given under the headings of topography and relief, structural geology, climatic conditions and firn-limits, hydrography and drainage, and erosion and denudation. Notes on the flora and fauna are added in an appendix; also a bibliography of the various parts of the subject. The work is illustrated by a number of excellent photographs taken by the author; but there is no map.

ASIA.

Shantung and Kiauchau.*—Under this title Baron v. Richthofen has issued a volume embodying, in a popular form, much of the matter that has already appeared in vols. i. and ii. (1877 and 1882) of his great work on China, the third volume of which is still so eagerly looked for. With this is incorporated such information as could be gleaned from the scanty additional materials relating to the province available before the date of printing of the present work (May, 1898). From the preface it is interesting to note that the acquisition of the harbour of Kiauchau by the Germans about this time last year was the realization of a hope that Baron v. Richthofen had ventured to express about the time of his own journeys in Shantung, nearly thirty years ago; and there cannot be the slightest doubt that the Baron's work in this province and other parts of Northern China has been one of the chief causes of that hope being accomplished. Kiauchau is described on the title-page as the gate of entry to Shantung, but Baron v. Richthofen also gives, on pp. 292–296, a short account of the vast mineral resources of Shansi (see the November number of this *Journal*) as properly belonging to its hinderland. (It is time we had an English translation for the now otherwise indispensable *Hinterland*.) He expresses his regret that the development of these mineral treasures has not fallen also to Germany, but the fact that the right to work them has been conceded to an Anglo-Italian syndicate is at least no reason why their working should not contribute to the prosperity of a German port. If this port is geographically the most convenient, which seems unquestionably to be the case, it must be in the interest of the Anglo-Italian syndicate, as it would certainly be best (from a purely economic point of view) for the world at large, that it should do so. In the concluding pages Baron v. Richthofen makes a few observations on the economic development of Shantung, and adds some general considerations on the approach of the new economic era in China. On one point in these general considerations it may be worth while to make a comment. Baron v. Richthofen insists, as he has always done, on the fact of China being by far the greatest storehouse in the world of "cheap, intelligent labour" (p. 306). That such is the case there is no reason to doubt; but it may fairly be asked—How long will Chinese labour remain cheap under new conditions? We know that one of the first results of the economic development of Japan has been a great rise in the cost of living and the wages of labour. In China a like rise may even be more marked. The mining and manufacturing districts of Japan are close to or on the seaboard, reducing to a minimum the cost of maintaining an industrial population by imported supplies. In China the region (Shansi) that promises most in the way of industrial development is far from the sea, and difficult of approach. If a great industrial population is to be maintained in that "poor mountain-land," as von Richthofen calls it (p. 293), it can only be by supplies brought probably from a considerable distance, which must greatly enhance the cost of living and of labour. It is not conceivable that it can so raise prices as to prevent the working of such

* 'Schantung und Kiautschou,' by Ferdinand Freiherr v. Richthofen. Berlin: Diet. Reimer, 1898.

vast resources, but the question of the extent of this rise, which seems inevitable, introduces an element of great uncertainty into any forecast of the precise nature of the consequences likely to flow from their working, great though these consequences must undoubtedly be. In a pocket accompanying the volume are three maps, two of Shantung, one geological and one orographical, on the scale of 1 : 1,000,000; and one of North-eastern China on the scale of 1 : 3,000,000, showing existing and projected railways.

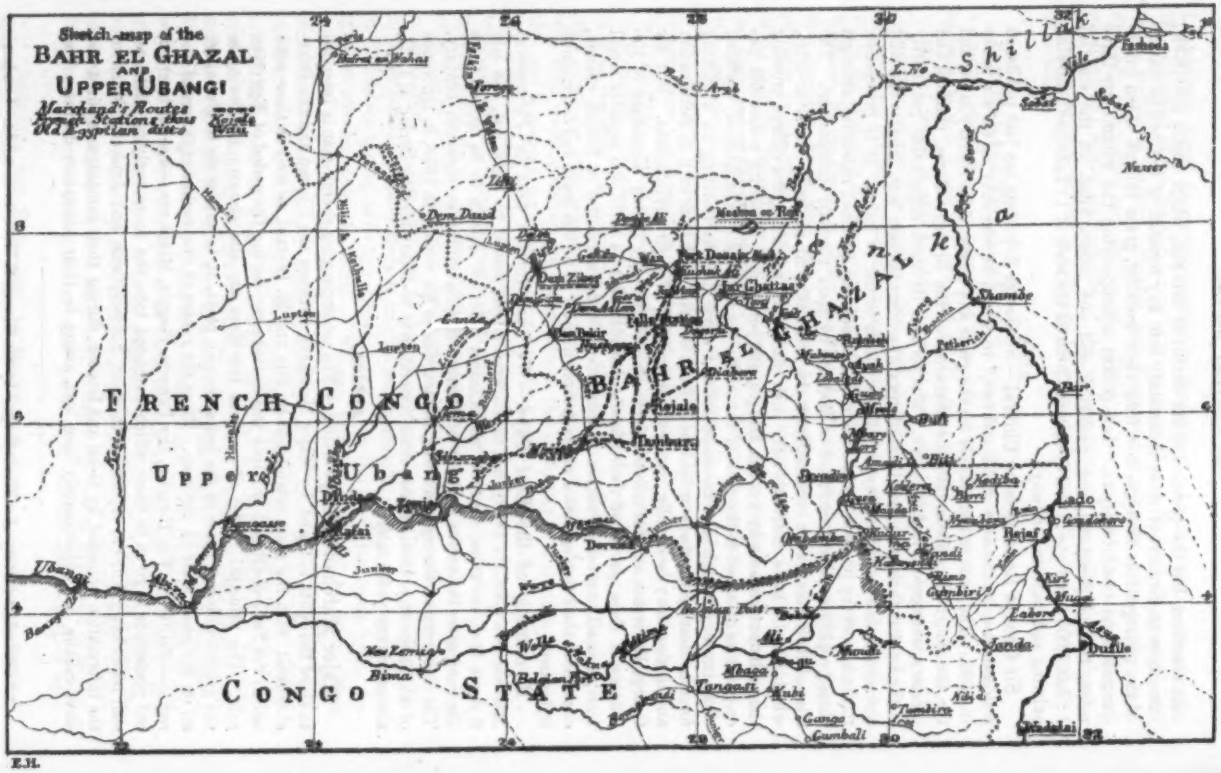
Sir George Robertson on Chitral.—Sir George Robertson has just published a description of the siege of Chitral fort,* in which he was shut up for six weeks in 1895. The book is remarkable for the grace and power of its literary style, and for the insight it affords into the character of the British officers, political and military, engaged on frontier work. But perhaps its most remarkable peculiarity is the light it throws on the life of the warlike mountaineers who inhabit the wild and almost inaccessible valleys of the mountain border of India. It is interesting to see how every phase of tribal, one might almost say national, existence amongst these people has been determined or modified by their physical environment. The sites of their villages are necessarily on the small alluvial plains by the river-sides, which afford a little cultivable soil; their roads must run along the valleys, crossing the turbulent streams by wooden bridges, and sometimes threading a *mauvais pas* on galleries attached to the face of the cliff. So, too, their principles of warfare; their strategy, which is of no mean order, always aims at isolating an attacking force by destroying roads or bridges in front or rear; and their skill in fortification and in siege may be equally traced to the training of their environment. But Sir George Robertson and his fellow-officers showed how, by taking advantage of the reliance of these people on their historic methods, and by their own superior moral force, a small number of native Indian troops, under a handful of British officers, could hold their own against a vastly greater number of no less brave and determined tribesmen.

Re-naming of the East Cape.—We learn from a note in *Petermanns Mitteilungen* (No. 10, 1898) that an Imperial ukase, issued in June last, has laid it down that, in future, the most easternmost point of Asia is to be named Cape Deshnef, after the active explorer of Eastern Siberia in the seventeenth century. The discovery of Bering strait was, in fact, due to his voyage in 1648, in ignorance of which the separation of Asia from America was re-determined by Bering in 1727, almost eighty years later.

AFRICA.

Major Marchand's Expedition.—The accompanying sketch-map is intended to show the route followed by Major Marchand between the Ubangi and the Bahr-el-Ghazal, with the posts established by him and M. Liotard, as well as those with which the Bahr-el-Ghazal province was dotted over during the period of Egyptian rule. The principal routes of previous travellers are also shown; but, owing to the great number of these in the better-known parts, it is impossible to give them all on the small scale of our map. Thus the routes of the earlier explorers of the region—Petherick, Von Heuglin, the Poncets, Piaggia, Miani, etc.—are not inserted, but preference is given to those which extended into the more outlying districts, still imperfectly known, especially those of Schweinfurth and Junker. Much of the information collected by Gessi and Lupton, during their campaigns against the slave-raiders, has unfortunately been lost, owing to their premature deaths. The

* 'Chitral, the Story of a Minor Siege,' by Sir George S. Robertson, K.C.S.I. London: Methuen & Co., 1898.


Sketch-map of the
BAHR EL GHAZAL
AND
UPPER UBANGI
Marchand's Route
Egyptian date
FRENCH CONGO
Upper Ubangi
BAHR EL GHAZAL
CONGO STATE
Shilluk
Nasser
Lado
Ubangi
Bima
Dufile
E.H.

region of the Mbomu and Welle has been traversed in all directions by Belgian officers, whose routes it has been impossible to show; but those followed by Hanolet, Nilis, and De la Kéthulle, in their important journeys towards the borders of Wadai and Darfur, before the evacuation of the Northern Ubangi districts in favour of France, are inserted. The routes of Marchand's expedition have been taken from a map given in the October number of the *Bulletin de l'Afrique Française*, which shows them only as far as Fort Desaix. Beyond this point the journey was made by river; but as the lower course of the Swe or Jur had not previously been laid down on our maps, the exact route cannot be known until the publication of the full report of the expedition. Some uncertainty prevails as to the French posts established within the Nile basin. Such are said to exist at Meshra-er-Rek, Jur Ghattas, and, according to some accounts, at Rumbek and Ayak. Major Marchand is even said to have advanced to within 50 miles of Lado, on hearing rumours regarding a European force in those parts. Whether, however, permanent posts were left towards the south-east, is very doubtful. The positions of the old Egyptian posts, of which all the most important are shown on our map, are taken from a useful map compiled by Mr. Ravenstein, to illustrate the letters of Emin Pasha. It will be noticed that the valley of the Swe was, under Egyptian rule, the least-known portion of the Bahr-el-Ghazal region, and that some increase of geographical knowledge will therefore result from the French expedition. In addition to the maps referred to in our last number (p. 524), one lately issued by the Intelligence Division of the War Office, showing the Nile basin from Berber to the Victoria Nyanza, will be found useful. The following may also be added to the list of authorities:—

Poncet, Jules, 'Le Fleuve Blanc' (1863).

Heuglin, Th. von, 'Die Tinnésche Expedition im Westlichen Nilquellgebiet 1863–64' (Supplementary Number 15, *Petermanns Mitteilungen*).

——— 'Reise in das Gebiet des Weissen Nil und seiner Westlichen Zuflüsse in den Jahren 1862–64' (1869).

Petherick, Mr. and Mrs., 'Travels in Central Africa' (1869).

Miani, 'Il viaggio di G. Miani al Monbutto' (1875).

Marno, E., 'Die Verlegungen im Bahr-el-Ghasal und deren Beseitigung' (*Petermanns Mitteilungen*, 1882).

Felkin, R. W., 'Aufzeichnungen über die Route von Lado nach Dara' (*Petermanns Mitteilungen*, 1881).

——— *and C. T. Wilson*, 'Uganda and the Egyptian Sudan' (1882).

Buchta, H., 'Der Sudan unter ägyptischer Herrschaft' (1888).

Casati, Major G., 'Ten Years in Equatoria' (1891).

M. Foureau's New Expedition.—It is announced, in the *Bulletin* of the Italian Geographical Society, that M. Foureau is about to renew his attempt to penetrate the country of the Tuareg, and open a route across the Sahara to the Sudan. He will now be accompanied by a force of 180 tirailleurs from Algeria, under the command of Colonel Lancy and other officers, so that it is hoped that the Tuareg, whose opposition has proved fatal to his hopes on previous occasions, will be overawed. The route chosen is that *viâ* Wargla, Fort MacMahon, and Fort Miribel.

The French in the Shari Basin.—At the opening meeting of the new session of the Paris Geographical Society, extracts of letters from M. de Behagle, leader of the commercial expedition into the Lake Chad region, were read, giving details of his progress down to the end of August. From Bangi to Wadda on the Ubangi, the expedition had followed the land route along the river-bank, 200 to 400 feet

above the water. The ground was composed of long and regular undulations running north and south. M. de Behagle states that his surveys show that the courses of the Kemo and Tomi (northern tributaries of the Ubangi) have been incorrectly shown on our maps. The former makes such a bend towards the east that it approaches within an hour's march of the Ubangi, 12 miles from its mouth. The expedition seems to have reached the Kuango, an almost unexplored tributary of the Ubangi, and to be therefore following a route considerably east of Gentil's and Maistre's. The Sultan of Dar Runga, in the south of Wadai, is said to have sent a caravan to the Ubangi—a fact quoted as proving the complete success of Gentil's mission. The latest accounts, however, report that the Sultan of Bagirmi has been driven out of his capital by Rabah, and that the towns whose inhabitants favoured the French have been destroyed.

Explorations on the Eastern Frontier of Liberia.—The September number of the *Bulletin de l'Afrique Française* contains a short account of a journey lately made by M. Hostains, an official of the French Ivory Coast, in the upper basin of the Cavalli, the stream which separates that territory from Liberia. M. Hostains proceeded by canoe to the village of Guipola, on the right bank of the Cavalli, advancing then by land in a northerly direction, through the forests on the right or Liberian bank of the river. The village of Guipola belongs to the Diutu tribe, which inhabits the right bank of the Cavalli for a considerable distance. In their customs the Diutu seem rather to resemble the peoples of the southern Sudan than those of the Guinea Coast. Like all the tribes to the north, they are entirely independent of the Liberian authorities, and even the Liberian Methodist missionaries have not established themselves in their country. They have not yet acquired the taste for alcohol. In the thick forests of the Diutu country the copal tree is common, though very rare on the lower Cavalli. M. Hostains reached the Guetepo village of Matua, in about 6° N., being everywhere well received, but was then obliged to turn on account of disturbances on the lower Cavalli. He was, however, able to collect some information respecting the country to the north, in which direction the forest becomes thinner and abounds in elephants. The Panion tribe is subject to a chief named Dia, who dwells on the left bank of the Cavalli. Two days north-east of his village the river Zo is reached; it is more important than the Cavalli, and abounds in hippopotami, though these are wanting in the other rivers of the country; beyond it are plains, in great measure treeless. On the river Zo an excessively primitive tribe called Zaé is said to dwell. They were even reported to possess rudimentary tails! It is thought that the Cavalli might afford a good means of penetration into the interior, if once the opposition of the Tepos who dwell on the lower river could be overcome.

Dr. Hans Meyer's Fourth Journey in East Africa.—A letter from Dr. Hans Meyer, dated Moshi, September 16, 1898, giving details respecting his latest expedition to Mount Kilimanjaro, appears in *Globus* for October 29 (vol. 74, No. 17). The programme sketched by Dr. Meyer before starting seems to have been successfully carried out. Reaching Moshi on August 3 by way of Usambara and the Pare range, the traveller ascended, through Marangu, to the east side of Mawenzi above the forest zone (about 12,800 feet), descending again to Useri and Laikokitok, on the north side of the mountain. The features of the hitherto unexplored upper region of Mawenzi to the east were thus examined, and the great north-eastern rift was seen to be not merely an eroded gully, but to be rather due to an important dislocation and sinking of the ground. An ascent was next made through the trackless northern forest, and a bivouac formed, at a height of 14,700 feet, at the north-eastern foot of Kibu, Dr. Meyer's only companion being the artist Herr Platz. The slopes of Kibu, composed here of glacial *débris*, rise extremely steeply.

On August 23, after a night in which the thermometer fell to 17½° Fahr., an ascent was made to the Kibu crater through the Hans Meyer gap. The ice conditions were found to have altered greatly since 1889, there being much less ice on the cone of eruption and elsewhere, while some of the outer glaciers showed signs of advance. Continuing his way round the northern and north-western side of the mountain above the forest zone, Dr. Meyer entered a very dry region, the forest being here much lower than on other sides. Radial lines of eruption stretch downwards between the north-west and west, the most important line, which seems to match that on the south-east of Mawenzi, being marked by a rugged group of cones, due to comparatively recent outbursts, whence vast lava-streams have covered the western side of the mountain. An ascent to the ice on this side led to the discovery of three important new glaciers, reaching down to 16,000 feet, the moraines at their feet giving evidence of recent fluctuations. Crossing the Shira ridge, which, contrary to expectation, proved to be of independent origin, and is certainly one of the oldest portions of Kilimanjaro, Dr. Meyer reached the extreme western districts of Chaga, examining *en route* the great western rift of Kibo (due originally to dislocation), which bends sharply to the south, and contains two glaciers, one of them reaching to a lower level (13,800 feet) than any other on Kilimanjaro. Further examination was made of the ice on the south side of Kibu, which shows a more imposing array of glaciers than any other. As a result of the journey, the map of Kilimanjaro will require much alteration, while the collections, photographs, and sketches will add much to our accurate knowledge of the mountain.

Garenganze to Blantyre, South of Lake Bangweolo.—An interesting journey has lately been made by Mr. D. Campbell, of the Garenganze Mission, with a view to the discovery of a short and inexpensive route to the coast *viâ* the Luapula and the south of lake Bangweolo. Mr. Campbell's diary of the journey is printed in *Echoes of Service* (August, 1898, part 2; and September, parts 1 and 2). Mr. Campbell left the Lufira valley in February last, proceeding south-east between the Kundelungu plateau and the Koni range, and crossing the Luapula near Chinama's village, visited by Mr. Weatherley. At its south end the Kundelungu stretches away in undulating woodland, known as the Bukanda country, famous for elephants and other game. From Chinama's the route lay first through hilly and sandy country, with many streams flowing west to the Luapula, and later through flat plains mostly flooded, the Luapula being again struck at its extreme southern bend. Mr. Campbell met with the dreaded chief, Mere-mere, but maintained friendly relations with him. His supremacy in the Ushi country is due to the possession of two oracles—blocks of metallic stone, said to have fallen from heaven. Many Va-Lamba refugees were seen among the Va-Ushi, having fled thither to escape the ravages of the Arab Chikwala in the west, and of the Mu-Vemba marauder Chikwanda in the east. The Luapula was skirted eastwards in its many windings through flooded plains, until near its exit from Bangweolo, when it was crossed at Sokontwe's ferry. This was only about twelve hours' march from the spot where Livingstone died, but inundations everywhere prevented a visit to it. The fear inspired by Chikwanda compelled Mr. Campbell to turn southwards towards the Irumi mountains through the pastoral Ilala country, apparently by a route to the east of Thomson's; much flooded land was again met with. Mr. Smitheman of the "Rhodesian concession" was found in camp at the Irumi mountains, prospecting for gold with five white companions. Mountains rose on either hand, whilst east and west was an immense tract of flat woodland. Proceeding eastwards through a promising and well-watered country, Mr. Campbell rounded the spur of the Changa range, and crossed the Lukosashe,

a broad stream with a strong current, which forms the boundary between the Ilala and Senga countries. It is not, as was supposed by Thomson, identical with the Lusiwazi, which rises in Moir's lake, but was crossed some days before the latter stream was reached. The Lusiwazi flows to the Loangwa east of the Muchinga mountains, which, with their fertile, well-irrigated land, seemed to Mr. Campbell suited for European settlement. The Loangwa was crossed at Lunda's ferry, being there about 250 yards wide and deep in midstream, and the further march to Mpeseni's led across the Nyemba hills, and afterwards over an open country laid waste by the Angoni war.

Belgian Scientific Exploration in the Congo State.—We learn from the *Mouvement Géographique* (No. 35) that plans have been made for a thorough scientific exploration of the territories of the Congo State, and that several travellers either have already set out or are at the point of doing so, in order to carry out this object. In addition to the expedition under Lieut. Lemaire, which started last spring for Katanga by the East Coast route, two botanists have proceeded by the West, while Captain Weyns has been charged with a mission which will occupy a year, and M. Delhez has been commissioned to investigate the fluvial fauna of the Congo, and to carry out soundings and determinations of water-temperatures. We regret to record the death of M. J. de Windt, the geologist attached to Lieut. Lemaire's expedition, who was drowned in Lake Tanganyika early in August through the capsizing of a canoe. He had been a pupil of the Abbé Renard, and had also studied under Penck and Richthofen, so that much had been hoped from his scientific work in the Congo basin.

Expedition to Sokotra.—A scientific party has lately left England for Sokotra, with a view to the thorough examination of the zoology of the island, of which little is yet known, but which is of special interest from the fact that its affinities seem rather Indian than African. The party consists of Dr. H. O. Forbes, director of the Liverpool Museum, Mr. W. R. Ogilvie Grant, of the Zoological Department of the British Museum, and Mr. Cutmore, taxidermist. Our Society has joined with the Royal Society and British Association in contributing to the funds of the expedition, and the Indian Marine Guardship *Elphinstone* has been placed at the disposal of the explorers for their conveyance from Aden to Sokotra. Our present knowledge of the fauna and flora of the island is due chiefly to the visits of Prof. Balfour (1880) and Drs. Riebeck and Schweinfurth (1881), the principal attention having been in each case devoted to the botany, though the German travellers were accompanied by two zoologists, who, amongst other collections, brought back a number of skulls of the aborigines. A good account of the surface features, inhabitants, etc., of the island, with illustrations of its strange flora and other objects of interest, was given by Dr. Schweinfurth, in *Westermanns Monatshefte* for 1891 (vols. 69, 70); Prof. Balfour's full report on the Botany of Sokotra, published as vol. 31 of the *Transactions of the Royal Society of Edinburgh* (1888), contains an introduction on the general features of the island, and a map on the scale of 1 : 250,000.

AMERICA.

The Sierra Madre of Mexico.—At the meeting of the British Association at Bristol a paper entitled "Across the Sierra Madre from Mazatlan to Durango" was read by Mr. O. H. Howarth. He said that the journey was undertaken in April, 1898, over a trail which, so far as he was aware, has not previously been described by any European. It crosses the main range of Western Mexico on a line about 120 miles south of that followed by him in 1892. The recent erection of a direct telegraph line connecting the port of Mazatlan with the city of Durango led to the

exploration of this new trail, it having been otherwise impracticable for any purpose except the casual mule traffic of the natives. The line runs in a north-easterly direction from the Pacific coast between the 23rd and 24th parallels N. lat., traversing an exceedingly wild and rugged district of the main range for a distance of 130 miles in a direct line, but nearer 200 miles following the precipitous contour of the mountains. There is probably no route through the great western range of North America exhibiting such vast alternations of elevation and depression within so comparatively limited an area. From Mazatlan the route followed was by a waggon road to the village of Presidio or Villa Union (altitude 120 feet), and thence to Concordia (altitude 380 feet), Piedra Blanca (610 feet), and the little mining town of Copala (1750 feet), which was reached on the evening of Easter Sunday. Up to this point the ascent is generally an even gradient amongst the foothills for the first 30 miles or thereabouts; but for some 70 to 80 miles further the range is constantly broken by enormous chasms which the trail traverses by repeated zigzag ascents and descents, frequently of 1500 to 2000 feet within a horizontal distance of 2 or 3 miles. Between the ranche of Ocotes and the cañon of the Rio Valuarte a descent of 1750 feet was made in a couple of hours; and on the afternoon of the same day the party camped at a point 4600 feet above this, on the first "cumbre," or dividing ridge. Early the next morning the pass of Los Monos was entered at an elevation of 6850 feet; and after descending again 2000 feet to the Llanito (little plain) of Chavarria, another ridge of the cumbre was crossed the same day at 9600 feet altitude. Throughout this region, remarkable for the grandeur of its scenery, the main ridge of the western anticline averaging 10,000 to 11,000 feet, seems to be split up into three or four parallel ranges with the above-mentioned deep gorges separating them. Beyond these commences a gradual descent from one to another of the curious mountain plateaus, or "llanos," including those of Las Juntas, Florida, Rusia, Mesa de Madroño, Coyotes, and Llano Grande, at altitudes from 9100 down to 8400 feet. These are usually open levels free from forest growth, and are utilized as grazing-ground for cattle. Occasionally, on the higher of them, where a water-parting occurs, may be seen a continuous stream course intersecting a plain not over a mile or so in length, at the ends of which the water is flowing in opposite directions. Beyond the Llano Grande extends a vast "mesa," or tableland, covered with scattered pine and other trees for a distance of some 30 to 40 miles at an altitude of 8000 feet. As this approaches the last hill range overlooking the great plain of Durango the ground becomes open and clear of timber, forming to all appearance an uninterrupted sweep towards the brow of the range. Yet within a mile of this last descent the traveller finds himself suddenly on the brink of the tremendous gorge of the Rio Chico—a winding rift across the level which has to be descended to a depth of nearly 2000 feet. Its geological structure is of great interest, exposing about halfway down a massive stream of pale grey vitreous lava, which has been covered to a depth of several hundred feet by other formations and sedimentary detritus. On reascending the opposite face and proceeding to the edge of the range, the plain of Durango comes in view, with the city a few miles from the foot of the last descent. This was reached on the evening of the seventh day from Mazatlan. The observations as to physical structure, temperatures, vegetation, and especially the human and animal occupants of these remote mountain fastnesses were of more than ordinary interest, presenting several features distinct from those noticed in other parts of the Western Sierras.

Dr. Steffen's Latest Journey in the Southern Andes.—We have received from Dr. Steffen, the well-known explorer of the Patagonian Andes, a copy of his report (in Spanish) on the exploration of the Rio Cisnes in 1897–98 (*ante*, p. 317),

accompanied by a map of his route. The main objects of the journey were the determination of the watershed between the Lake La Plata of the Argentine maps, and the Pacific; and the discovery of the ultimate course of the Rio Félix Frias, also shown on Argentine maps in the latitude of the Poyehuapi estuary. Having discovered a large river, comparable to the Aisen, near the south end of that estuary, which appeared to lead in the required direction, Dr. Steffen sent back the steamer which had brought his party from Puerto Montt, and proceeded up the river—evidently the Rio Cisnes of Simpson—with two boats and two canvas skiffs. A fall caused by huge rocks in the bed of the stream soon necessitated the abandonment of the former, while a way had to be cut overland through the dense vegetation, not a trace of human inhabitants being seen. The valley in this part much resembled in character those of the Aisen and Palena. Further on, the Cisnes was hemmed in between perpendicular cliffs, and the difficulties of the march were increased by torrential rains. In order to gain a general view of the country, an ascent was made (February 25–27) to a height of 4500 feet on the north side of the valley, which was seen to continue eastwards towards the open Patagonian plateau. Towards the south a lake was descried, occupying a depression in the midst of a labyrinth of snowy ranges. This lake was found by exploration to send a short effluent to the Cisnes, and to be fed by a stream from the south-east. The longitudinal depression shown by Ezcurra in this locality as occupied by the "lagos Elizade," was found to have no existence; it was also proved that the extent attributed by Argentine explorers to the La Plata lake was exaggerated, and that the Cisnes drained the whole Andine region between the Palena and Aisen. As it seemed impossible to proceed further towards the south-east, it was decided to continue the ascent of the Cisnes valley, a portion of the party being sent back to the coast. An ascent to a height of 4600 feet on the south side of the valley disclosed the fact that the divide in the direction of the La Plata lake is formed by high snowy ridges. After renewed difficulties from the weather and the state of the ground, the valley at last opened out, showing a series of terraces marking ancient levels of the river. It became evident that the Cisnes is identical with the Rio Frias discovered by Argentine explorers; but although the country improved, and, as on the upper courses of the Aisen, Palena, and other Patagonian rivers, showed itself well adapted for cattle-rearing, no trace of settlement was met with. It therefore became necessary, owing to the scarcity of supplies, to turn to the south-east, and make for the settlements on the Senguer, east of the main watershed. This proved to be lower and less steep than further west, so that, pressing forward with two men only, Dr. Steffen was able, after his supplies had been entirely spent, to reach the Casa Steinfl, east of Lake Fontana, and to send help to his party. The explorers returned to the Rio Frias by a more northerly route, and subsequently proceeded north-north-east, crossing and recrossing the continental divide, and striking the caravan route to Lake Nahuelhuapi in the valley of the Rio Teca. Dr. Steffen was able to prove that the water-parting, though falling within the system of the Andes, is not here formed by continuous snowy ridges, but lies considerably to the east of the line of highest summits. The report gives many instructive details respecting the physical geography of the region, which is also illustrated by numerous reproductions of Dr. Steffen's photographs.

AUSTRALASIA AND POLYNESIA.

The Boring at Funafuti.—Information regarding the recent boring operations at Funafuti is given in the Sydney *Daily Telegraph*. The most interesting part of this year's work consists in the boring in the lagoon of the atoll, which has been carried out from the bows of H.M.S. *Porpoise*. During the first twenty-four hours

a depth of 109 feet below the bottom of the lagoon was attained, the depth of the water being 103 feet. The first 80 feet consisted of sand, composed of joints of the seaweed *Halimeda*, and of fragments of shells. Below that depth fragments of coral appeared, becoming progressively larger at the deeper levels. From more recent information supplied by Prof. Bonney (*Nature*, November 10), it appears that at the depth of 144 feet hard coral rock was reached, which stopped the operations, owing to the great length of unsupported pipe. A second boring was, however, commenced nearer the centre of the lagoon, the limit of sand being again reached at 80 feet, below which a rather hard coral gravel was found. This was pierced to a depth of 33 feet, when work was abandoned, owing to the necessary departure of the *Porpoise*. The old bore on the main island of Funafuti, which terminated last year at 698 feet, has been continued downwards, the cleaning and relining having been successfully accomplished. On August 15 a depth of 840 feet had been reached, a hard rock largely composed of coral and shells having been struck. The depth mentioned is exactly that at which a strongly marked shelf occurs on the outer face of the reef, which has been supposed to mark the downward limit of coral formation, so that, as operations have since been continued, some specially valuable results should have been obtained.

Dr. Lauterbach on the Geographical Results of the Kaiser-Wilhelms-Land Expedition.—An instructive sketch of the geographical results of the expedition which successfully explored the interior of German New Guinea in 1896, is given by Dr. Lauterbach in the *Zeitschrift* of the Berlin Geographical Society (1898, No. 3). The writer describes in turn the chief physical features of the country traversed, beginning with the shores of Astrolabe bay, and coming next to the plain which lies at the head of it. This he describes in some detail, as many of its characteristics may be regarded as typical, in a general way, of the whole region. Covered for the most part with tall forest, its mammalian fauna is extremely poor, whereas bird life is particularly well developed. Everywhere up to 3000 feet and more, Dr. Lauterbach elsewhere remarks, the woods resound with the most varied bird-notes. The Tajomanna (Oertzen) mountains which bound the plain to the west, and which may be regarded as an extension of the Finisterre range, consist of a core of old volcanic rocks, flanked by sedimentary deposits. Exposed to the full force of the north-west monsoon, they receive a large rainfall, and the streams which descend from them to the Astrolabe plain contain water throughout the year. Of the Ramu, the large river discovered in the interior, we learn that in the parts explored its breadth varies from 80 to over 300 yards, while in places its bed exceeds half a mile in width. In the current the depth is generally from 10 to 15 feet, and is rarely less than 6 feet. Canoes, which vary in form as the stream is descended, are everywhere employed by the natives. The vegetation of its banks, though rich in species, presents a uniform aspect. Forest (in which deciduous trees of the families Combretaceæ, Bignoniaceæ, and Bombaceæ are especially plentiful) covers the high concave banks, while a growth of wild sugar-cane is seen on the lower convex side of the bends. In the lower course coconut palms line the banks, and primeval forest is little seen owing to the dense population. In places the Ramu closely skirts the spurs of the Bismarck range, from which it receives many important tributaries; one of these has formed a broad and deep valley, which seems to separate the Bismarck range from another to the west, which Dr. Lauterbach proposes to call Hagen range. Owing to the neighbourhood of the mountains, the meteorological conditions are very different in the Ramu valley from those of the Astrolabe plain. The Bismarck range forms an important mountain *massif*, which apparently has a considerable breadth from north to south, and is connected with the Albert Victor and Sir Arthur Gordon

ranges in British territory. Where examined, it consisted of a number of parallel chains, running chiefly from north-west to south-east, and rising steeply to a height of over 13,000 feet. Dr. Lauterbach thus sums up the general features of the region traversed: A vast chain, consisting mainly of old crystalline rocks, and rising to heights of over 13,000 feet, traverses New Guinea from north-west to south-east. Extensive plains, traversed and in part built up by the Empress Augusta and Ramu rivers, lie to the north of this range; while, on either side of their mouths, chains of lesser elevation, in part composed of recent coral limestone, run parallel to the coast. South of Astrolabe bay the great Finisterre range, also parallel to the coast, encloses the Ramu valley between itself and the Bismarck range. The interior valleys, as also the lower ranges, are thinly peopled, whereas the lower courses of the streams, especially that of the Ramu, are occupied by an extremely dense population. Agriculture is practised everywhere. Granted that there are no hindrances to navigation in the lowest part of its course, the Ramu supplies an excellent waterway to the best agricultural plains of the country, and an easy means of access to the foot of the central mountain chain.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Thermo-Geographical Studies.—In the handsome volume* recently published at the expense of the "Carlsbergfondet," Copenhagen, we find another attempt to solve the problem of expressing the temperature variations of the atmosphere at any point on the Earth's surface by means of mathematical formulæ. The author, Mr. C. L. Madsen, was awarded the Hodgkins Medal (1895) by the Smithsonian Institution for this essay. The thermo-geographical problem is here made to include, not only the analytical determination of the normal mean yearly temperature of a place of given geographical position, but also of the annual movement in temperature, as defined by the corresponding normal mean monthly temperatures. In other words, it is required to find, first, an equation which shall accurately express the mean annual temperature at any place in terms of the terrestrial position of that place; and, second, an equation which shall represent the mean temperatures of the successive months in terms of the mean annual temperature, and certain local or position constants to be determined. In both cases the further, and hitherto fatal, condition is imposed, that the form of the mathematical expressions must be sufficiently simple to allow of their use in practical work. In the first part of the investigation, the author obtains the mean annual temperature of a series of points from the isothermal charts of Buchan, Hann, and others. From these, the average annual temperature of each parallel of latitude is found by interpolation, and the difference between the interpolated mean at any meridian on the parallel and this average is the "annual thermo-geographical component" of the point of intersection. This component the author believes to be a quantity of exceptional interest in itself, as representing the disturbance of the temperature of a place from what is properly due to its latitude. After applying a series of corrections to the "components," two equations are formed, one for the northern and another for the southern hemisphere, which differ widely in the values of their constants, but agree in including all variable quantities in a single "$\cos\phi$" term, which occurs only in its first and second powers. So far, there is a distinct advance in the direction of simplicity, but this is scarcely maintained in the determination of the values of the variable function. The

* 'Thermo-geographical Studies: General Exposition of the Analytical Method applied to Researches on Temperature and Climate.' By C. L. Madsen. Copenhagen: G. E. C. Gad, Bookseller to the University.

Atlantic middle zones of the northern hemisphere, for example, are subdivided into areas, for each of which special formulæ have been constructed by means of the method of least squares, and the value of the variable in the general equation has to be computed from these in each case. The expression for the monthly variations of temperature is of course more complicated, as the local effects have to be further taken into account, and varying astronomical considerations are involved. The method followed is to a certain extent the same, but the result now contains two important sets of coefficients, the "dynamo-cosmical" and the "thermo-geographical." The values of the latter are found to be independent of the annual mean temperatures, and hence to furnish a convenient numerical definition of climate. It is proposed to arrange them in seven groups, representing seven separate types of climate, viz.—

Value of coefficient in degrees C.	Definition of climate.	Class.
0°–3°	Tropical and extreme insular	I.
3°–4°	Extreme coast	II.
4°–6°	Normal „	III.
6°–9°	Normal continental	IV.
9°–11°	Central „	V.
11°–15°	Extreme „	VI.
Over 15°	Polar	VII.

We select the following examples at random from a large number of cases worked out for different latitudes: Class I., Valentia; II., Edinburgh; III., London; IV., Warsaw; V., Kazan; VI., Krasnoyarsk; VII., Yakutsk.

A New Deep-sea Expedition.—Early in November an expedition, organized by Mr. George Murray, Keeper of the Botanical Department of the Natural History Museum, left London for the purpose of investigating the fauna of the intermediate oceanic depths. Different opinions have been held by naturalists as to the existence of living organisms in the vast intermediate zone between the upper and bottom belts, Prof. A. Agassiz, in particular, holding that this is devoid of life, while Sir John Murray and others hold that the ocean is inhabited throughout its whole depth. Appliances designed for the collection of organisms from stated layers only having proved unsatisfactory, the new expedition will employ the method whereby collections are made from different depths by a vertical series of tow-nets, gradually lowered through the water, Sir John Murray having found that by increasing the depth at which the nets are towed, new forms of life are obtained in addition to those collected from the surface layers. Work was to be commenced at the edge of the 100-fathom platform, about 30 miles from the west coast of Ireland, and it was proposed to steam slowly westwards, increasing the number of nets employed until, when the chain reached a depth of 2000 fathoms, 38 would be in use. The *personnel* of the party includes Mr. V. H. Blackman and Dr. Gregory, of the Natural History Museum, Mr. J. E. S. Moore, the investigator of the fauna of Lake Tanganyika, Dr. Sambon, and Mr. Highley, an artist. The s.s. *Oceana* has been chartered for the expedition, and valuable assistance was afforded for the outfit by the Silvertown Cable Co. Grants of money have been made by our Society, and the Drapers' and Fishmongers' Companies.

Soundings in the South Pacific.—We have received a copy of a special report, published by the Admiralty, on the cruises of H.M. SS. *Penguin* and *Waterwitch* in search of reported dangers in the South Pacific to the northward of Fiji.

The systematic investigation of the depths in the South Pacific was begun in 1888 by H.M.S. *Egeria*, and ceased in the following year. Between 1890 and 1894 only isolated soundings were obtained, but regular work was resumed in 1895, and has been continued. The present report contains detailed accounts of the cruises of the two vessels by Commander J. W. Combe, of the *Waterwitch*, and Captain A. M. Field of the *Penguin*, and lists of soundings and temperature observations are appended. The existence of the *La Brillante* shoal and the *Melanie* rock has been disproved, and many additions and corrections have been made in the charts. Both vessels obtained excellent lines of soundings on their voyages to and from Sydney and Hobart, and various routes for a cable to Fiji are now thoroughly investigated.

The Determination of Longitudes by Photography.—We have received from the author a copy of a reprint, from the *Memoirs of the Royal Astronomical Society*, of a paper on the determination of terrestrial longitudes by photography, by Captain E. H. Hills, R.E. Captain Hills gives the result of extended experience of the method in the field, and reduces it to a practical form at once available to travellers and explorers. Minute instructions are given for making the necessary observations and exposures, and all the precautions to be taken by inexperienced observers are clearly pointed out; the measurements of the plates are described, and an example of the method of computation, due to Prof. Turner, is given in full. The advantages of the photographic over a visual method are the small amount of work actually required in the field, and the slight demands made on the skill of the observer to obtain results of a high standard of accuracy. Against these must be set the disadvantages of not obtaining results which are immediately available, and of the unavoidable weight of the camera and its stand, a high degree of stability being absolutely essential.

GENERAL.

Memorial to General Woodthorpe.—We call the attention of Fellows of our Society to the fund which has been started for a memorial to the late Major-General R. G. Woodthorpe, whose valuable services to geography on the Indian frontiers are well known to our readers. It has not yet been decided what form the memorial shall take, but it is mentioned in this connection that the blind brother of the deceased officer has been left by his death in very straitened circumstances. The secretaries to the fund are Colonel C. R. MacGregor, C.B., and Major F. B. Longe, R.E., and subscriptions will be received in this country by Messrs. Henry S. King & Co., 45, Pall-mall.

OBITUARY.

Lieut.-General Sir William H. Goodenough, R.A., K.C.B.

By the PRESIDENT.

THE late Lieut.-General Sir William H. Goodenough, K.C.B., had been a Fellow of this Society for thirty-four years, and had served on our Council. The news of his sudden death at the Cape, last October, was received with regret, and with a deep sense of the loss that has been sustained by the service, and by a large circle of friends.

William Howley Goodenough was born on April 5, 1833, being the third son of Dr. Edmund Goodenough, the Head Master of Westminster, and afterwards Dean

of Wells, by Frances, daughter of Samuel Pepys Cockerell, Esq. He was brother of our lamented associate, Commodore James G. Goodenough, C.B., C.M.G. William H. Goodenough went to Westminster at the age of twelve, and always retained his affection for the old school. He went down to ask for an "early play" on his appointment to the command at the Cape. He went from Westminster to the Woolwich Academy, where he specially distinguished himself, and became a second lieutenant R.A. in December, 1849, and captain in 1856. During the Indian Mutinies he served in the action of Pandi Nadi, at the siege and capture of Lucknow, and at the attack and capture of Fort Birwah. During his Indian service he was severely wounded three times. He was promoted to the rank of major in 1858, lieut.-colonel in 1869, and colonel in 1877. In 1864, Colonel Goodenough became a Fellow of our Society. From 1871 to 1874 he was military attaché at Vienna, and in 1874 he married the Countess Anna Kinsky, by whom he has four daughters. He was assistant adjutant-general at Woolwich from 1874 to 1876, and at the Horse Guards from 1876 to 1881. In 1882 he commanded the artillery during the Egyptian Campaign, and was created a C.B. From 1886 to 1889 he was Inspector-General of Artillery at head-quarters, became a major-general in 1886, and commanded the Thames District from 1889 to 1892. He became a lieut.-general in 1891. He was a warm supporter of the National Artillery Association; and jointly with Colonel Dalton, R.A., he published the 'Army Book for the British Empire' in 1893.

General Goodenough was an ardent geographer, and he took an hereditary interest in the progress and welfare of this Society; for his father, the Dean of Wells, was an original member, and contributed a learned paper to the first volume of our *Journal*. His brother, my old messmate, Commodore Goodenough, was a valued Fellow of the Society, who was never tired of sending us information of geographical interest, and helping us in every way in his power. Both brothers were members of the Geographical Club. General Goodenough became a member of our Council in 1894, and remained on it until he was appointed to the command of the troops in South Africa. He went out in December of that year, and was twice acting governor. He was created K.C.B. in 1897. He died suddenly, of pneumonia, on October 24, 1898; but he had been on leave to St. Helena, for his health, in the previous year.

William Goodenough, as a boy, displayed abilities far above the average, and was so far in advance of the other cadets of his batch that he passed out of the Woolwich Academy and got his commission a year in advance of them. As an officer he was remarkable for his ability and zeal, and for the deep interest he took in all questions connected with the good of the service, and especially with the welfare of the men. Latterly he was a great reader, and was remarkably well informed, taking special interest in social and historical questions, while his thorough knowledge of geography made him a great acquisition to our Council. Goodenough's most amiable and sympathetic character endeared him to a very great number of friends. He never changed, there was always the same genial warm-hearted welcome from him, and the present writer can speak of an unbroken friendship of more than fifty-four years. Honourable, high-principled, and zealous, he will long be missed, both in the service of which he was an ornament, and by the relations and friends who mourn his loss.

Sir Henry Barkly, G.C.M.G., K.C.B.

Sir Henry Barkly, a former Vice-President of our Society, died at his residence in South Kensington on October 21, at the advanced age of eighty-three years.

The deceased was the only son of Mr. Æneas Barkly, a native of Ross-shire, but with a business in London in connection with the West India trade. Educated at Bruce Castle School, Tottenham, Henry Barkly followed in his father's footsteps, and, by his devotion to business, acquired a practical experience which served him in good stead in his after life. From 1845 to 1849 he sat in Parliament as member for Leominster, and was throughout a warm supporter of Sir Robert Peel in his commercial policy. His official connection with the colonies, in the service of which the best part of his mature life was spent, began in 1849, in which year he became Governor and Commander-in-Chief of British Guiana, where he owned property. In this capacity he did valuable service to the colony, and deserves to be remembered above all for his advocacy of the introduction of coolie labourers from the east, which has since met with considerable success. In 1853 he was created a K.C.B., and in the same year was transferred as Governor to Jamaica, where he remained three years. In 1856 he was appointed Governor of Victoria; and in 1863, of Mauritius. From 1870 to 1877 he was Governor of the Cape of Good Hope, and it was during his tenure of the office that "responsible government" was established in that colony (1872). In 1874 he was made a G.C.M.G., and in 1877 he retired on a pension. In 1879 he served on the Royal Commission on the Defence of British Possessions abroad. He became a member of our Society in 1870, and served on its Council from 1879 to 1883, and from 1885 to 1889, occasionally taking part in the discussions at the evening meetings. He was twice married—in 1840, and again in 1860.

CORRESPONDENCE.

Common Sense at Last.

Among the latest news from India is an item that ought to gratify geographers. An officer of the Russian General Staff has visited India, has been hospitably entertained, and, so to say, shown over the north-west frontier, or at least some of the most interesting and, in a military sense, important sections of it. This is as it ought to be, and is no more than a fair return for the courtesy and absence of reserve shown by the government of the Tsar to the many Englishmen, both military men and civilians, who have travelled in Russian Asia of late years. May we not hope that it has come to be realized at Simla that all attempts to draw a curtain along a frontier thousands of miles in extent are not less futile than undignified, and that henceforth it will not be thought indispensable to stamp every scrap of mapping done by our surveyors on or beyond the frontier with the fatal word "Confidential," the sole result of which is to vex innocent students and hinder the spread of geographical knowledge? Some pertinent remarks were made in this connection by Mr. Black when reviewing an annual Survey Report of the Government in our *Journal* not long ago; and I would venture to supplement these by respectfully suggesting that the Council of the R.G. Society might urge on the Secretary of State for India the publication of the maps of portions of Baluchistan and of Persia which have been prepared in recent years, but are at present carefully withheld from general knowledge.

M. R. Haig, Major-General.

October, 1898.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1898–1899.

First Ordinary Meeting, November 14, 1898.—Sir CLEMENTS MARKHAM, K.C.B., President, in the Chair.

ELECTIONS.—*Rev. Alexander Dewar; G. A. Dolby; The Duke of Hamilton; Robarts Harper; Alfred Hughes; Lieut.-General Sir Stephen Bartlett Lakeman; A. Kingsley Macomber; Colonel Charles Henry Tilson Marshall (Indian Staff Corps); Charles Spargo; Captain Edward A. Stanton (Oxfordshire Light Infantry).*

The Paper read was:—

"The President's Opening Address, Session 1898–99."

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. Rd. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Austria—Croatia. *Deutsche Rundschau G.* **21** (1898): 22–28. **Umlauft.**

Die Plitvicer Seen in Kroatien. Von Prof. Dr. Friedrich Umlauft. *With Map and Illustrations.*

Austria—Graz. *Sitzb. k. A. W. Wien* **107**, Abth. IIa. (1898): 167–181. **Hann.**

Ueber die Temperatur von Graz Stadt und Graz Land. Von J. Hann.

The mean annual minimum temperature for the town of Graz is 6° Fahr., the mean maximum 89° Fahr., a range of 83°; while for the immediately surrounding country the mean annual minimum is −3°·3, and the maximum 87°·5, a range of 90° 8; thus showing the more extreme character of the country climate.

Austria—Triest. *Sitz. k. A. W. Wien* **106**, Abth. IIa. (1897): 685–721. **Mazelle.**

Tägliche Periode des Niederschlages in Triest. Von Eduard Mazelle.

On the daily periodicity of rainfall in Triest.

Austria—Tyrol. *M. k.k. G. Ges. Wien* **41** (1898): 477–491. **Walde.**

Zur Besiedelung Tirols durch illyrische Stämme. Von Dr. Alois Walde.

A study of some of the place-names of Northern Tyrol with reference to their Illyrian origin.

Austria-Hungary—Bosnia. **Freeman.**

Trade of Bosnia and the Herzegovina for the year 1897. Foreign Office, Annual No. 2167, 1898. Size 10 × 6¼, pp. 10. *Price* 1*d.*

Austria-Hungary—Bosnia. *B.S.R. Belge G.* **22** (1898): 295–304. **Hontoir.**

Une visite à la station météorologique de la Bielasnica en Bosnie. Par E. Hontoir.

Austria-Hungary—Earthquakes. **Mojsisovics.**

Sitz. k. A. W. Wien **107**, Abth I. (1898): 195–433.

Mittheilungen der Erdbeben-Commission der kaiserlichen Akademie der Wissenschaften in Wien. V. Allgemeiner Bericht und Chronik der im Jahre 1897 innerhalb des Beobachtungsgebietes erfolgten Erdbeben zusammengestellt von Dr. Edmund v. Mojsisovics.

France—Ain. **Corcelle.**

Géographie militaire du département de l'Ain. Par J. Corcelle. Bourg. Size 8½ × 5½, pp. 12. *Presented by the Author.*

France—Aveyron. **Durand and Lapouge.**

B.S. Languedoc. G. **20** (1897): 285–315, 461–476; **21** (1898): 30–59.

Matériaux pour l'Anthropologie de l'Aveyron. Par le Dr. Durand et G. de Lapouge.

France—Eastern. *B.S.G. de l'Est* (1898): 74–83. **Bleicher.**

Notes et souvenirs des excursions de la Société de Géographie de l'Est à Essey-la-Côte et à la côte de Sion. Par M. le Professeur Bleicher.

France—Lyons. *B.S.G. Lyon* **15** (1898): 177–224. **Devaux.**

Les noms de lieux dans la région lyonnaise aux époques Celtique et Gallo-Romaine. Par M. l'Abbé Devaux.

A study of the ancient place-names of the region near Lyons.

France—Montpellier. *B.S. Languedoc. G.* **21** (1898): 123–172. **Vigié.**

Des Enceintes successives de la ville de Montpellier et de ses fortifications. Par M. Vigié.

France—Southern. *Mém. S. Spéléologie* **2** (1898): 1–246. **Mazauric.**

Le Gardon et son Cañon inférieur. Par M. Félix Mazauric. *With Plans.*

Germany—Berlin. *Meteorolog. Z.* **15** (1898): 321–332. **Börnstein and Less.**

Die Temperaturverhältnisse von Berlin. Von R. Börnstein und E. Less.

An elaborate discussion of the temperature records of Berlin, one of the results of which is to show that the house-roofs of a city play the same part in influencing temperature as the ground does, with the result that the temperature observed immediately above the roofs is more representative of the locality than that observed on the ground or at a window.

Hungary—Banat. *Deutsche G. Blätter* **21** (1898): 65–88 **Braess.**

Die Schwaben im Banat. Von Dr. Martin Braess.

An interesting sketch of the history of the immigration of South Germans into the Banat, and the customs of their descendants.

Hungary—Rain and Rivers. **Hegyfoky.**

Mathemat. u. Naturw. Berichte Ungarn **14** (1898): 239–284.

Wasserstand der Flüsse und Niederschlag in Ungarn. Von J. Hegyfoky.

A study of the data for precipitation and river-level in Hungary.

Italy. **Smith.**

A Pilgrimage to Italy. An account of a Visit to Brindisi, Naples, Mount Vesuvius, Pompeii, Rome, Florence, Venice, and Milan. By the Rev. James Smith, B.D. Part i. Aberdeen, 1898. Size 9 × 6, pp. 1–64. *Map and Illustrations. Price* 1*s. Presented by the Author.*

Italy—History. **Stillman.**

The Union of Italy, 1815–1895. By W. J. Stillman. Cambridge: The University

Press, 1898. Size 8 × 5¼, pp. x. and 412. *Maps. Price* 6*s. Presented by the Publishers.*

The author traces the progress of the unification of Italy, illustrating the various steps by historical maps. He speaks from an intimate knowledge of Italian public life extending over nearly forty years, and, in looking forward to the future of the country, feels compelled to the pessimistic conclusion, "Too quickly and too easily was Italy made." He brings forward the evidence which leads him to this opinion.

Italy—Sicily. **[Ludwig Salvator.]**

Ustica. Prag: Heinr. Mercy Sohn, 1898. Size 16½ × 13, pp. xii. and 132. *Maps and Illustrations. Presented by H.I.H. the Archduke Ludwig Salvator.*

The Archduke Ludwig Salvator has produced another of the superb folios of which he has devoted so many to the description and delineation of the islands of the Mediterranean. The little island of Ustica lies north of Palermo, considerably to the west of the Lipari group, and is, roughly speaking, two miles in diameter. It is treated very fully in all its aspects, including the primitive methods of agriculture employed by the people.

Italy—Umbria. *B.S.G. Italiana* **11** (1898): 488–499. **Baratta.**

Sulla distribuzione topografica dei terremoti nell' Umbria. Comunicazione del socio M. Baratta. *With Map.*

On the distribution of earthquakes in Umbria.

Montenegro. *B.S.G. Italiana* **11** (1898): 499–505. **Baldacci.**

Il mio settimo viaggio nel Montenegro. Lettera del socio. Dott A. Baldacci.

Pyrenees. **Spender and Smith.**

Through the High Pyrenees. By Harold Spender. With Illustrations and Supplementary Sections by H. Llewellyn Smith. London: A. D. Innes & Co., 1898. Size 9 × 6, pp. xii. and 370. *Map. Price* 16*s. Presented by the Publishers.*

Describes journeys through the Pyrenees, with a full account of Andorra, and advice as to mountaineering excursions.

Sweden. **Constable.**

Trade of Stockholm and the Eastern Coast of Sweden for the year 1897. Foreign Office, Annual No. 2062, 1898. Size 10 × 6, pp. 36. *Price* 2½*d.*

Sweden. **Herbert.**

Report on the Foreign Trade, Mineral Production, etc., of Sweden. Foreign Office, Annual No. 2028, 1898. Size 9½ × 6½, pp. 22. *Price* 1½*d.*

Sweden—Geological Survey. ———

Sveriges Geologiska Undersökning. Ser. C. No. 161 A and B, Om Skandinaviens Geografiska Utveckling efter Istiden, af Gerard de Geer. Text and Maps (1896, pp. 160); No. 165, Om högsta Marina Gränsen i norra Sverige, af A. G. Högbom (1896, pp. 26, map); No. 166, Den centraljämtaka Issjön, af Gunnar Andersson (1897, pp. 38, maps); No. 167, Maddelanden om jordstötar i Sverige, af E. Svedmark, V. (1897, pp. 30, map); No. 169, Några anmärkningar om de Isdämda Sjöarne i Jemtland, af A. G. Högbom (1897, pp. 18); No. 171, Om de geologiska förhållandena i trakten omkring Sjangeli Kopparmalmsfält i Norrbottens Län, af Walfr. Petersson (1897, pp. 14, map); No. 173, Om rullstensåsarnes Bildningssätt, af Gerard de Geer (1897, pp. 26); No. 174, Sveriges Geologiska Undersöknings Utställning vid allmänna Konst- och Industri-Utställningen i Stockholm 1897 jemte meddelanden om Institutionens Verksamhet Landets geologiska Beskaffenhet och Tillgångar af Malmer, Användbara berg- och jordarter M.M., af Edvard Erdmann (1897, pp. 54, plate); No. 175, Kiirunavaara och Luossavaara jernmalmsfält i Norrbottens Län, af Hjalmar Lundbohm (1898, pp. 72, map and plates). Stockholm. Sizes 9 × 6, 9 × 6½, 9½ × 6½, 10 × 6½.

Sweden—Gothenburg. **Duff.**

Trade of Gothenberg and District for the Year 1897. Foreign Office, Annual No. 2161, 1898. Size 10 × 6, pp. 44. *Price* 2½*d.*

Switzerland. *Quarterly J. Geolog. S.* **54** (1898): 279–289. **Jennings.**

The Structure of the Davos Valley. By A. Vaughan Jennings.

Switzerland—Statistics. ———

Annuaire Statistique de la Suisse. Publié par le Bureau de Statistique du Département Fédéral de l'Intérieur. Septième Année, 1898. Bern, 1898. Size 9½ × 6½, pp. iv. and 454.

United Kingdom. *Quarterly J. Geolog. S.* **54** (1898): 251–278. **Codrington.**

On some Submerged Rock-valleys in South Wales, Devon, and Cornwall. By T. Codrington.

United Kingdom. **Johnson.**

The Imperial Library. Imperial Britain. A comprehensive description of the Geography, History, Commerce, Trade, Government, and Religion of the British Empire. Vol. i. The British Empire in Europe, etc. By the Rev. Theodore Johnson. London: The Imperial Press, 1898. Size 9 × 6, pp. xvi. and 296. *Maps and Illustrations. Presented by the Publishers.*

The scope of the work, of which this is the first volume, is indicated in the preface thus: "Under this comprehensive and noble title, the author has endeavoured to represent the geography, history, commerce, trade, government, and religion of the vast territories and possessions of the British Empire, which now comprises one-sixth of the Earth's surface, with a population numbering one-fifth of the inhabitants of the whole world." The description of the English lakes is incomplete and inaccurate, and the work as a whole might be improved by revision.

United Kingdom. **Lyde.**

A Geography of the British Isles. By Lionel W. Lyde. London: A. & C. Black, 1898. Size 7 × 5, pp. vi. and 128. *Price* 1*s. Presented by the Publishers.*

This is a new text-book which deserves success. The subject is handled with regard to the broad principles of geography, and at the same time with due attention to accuracy of detail. The facts which are stated are carefully selected, and treated so as to bring out the causes on which they depend, and although there are no illustrations, the book is attractively written, and bears throughout marks of the experience of the author in practical teaching.

United Kingdom—England. **Baedeker.**

London and its Environs. Handbook for Travellers. By Karl Baedeker. With 3 Maps and 20 Plans. Eleventh Revised Edition. Leipsic: Karl Baedeker; London: Dulau & Co., 1898. Size 6¼ × 4¼, pp. x., 438, and 44. *Presented by Messrs. Dulau & Co.*

United Kingdom—England. **Cuttriss.**

P. Yorkshire Geol. and Polytechnic S. **13** (1898): 311–324.

Notes on the Caves of Yorkshire. By S. W. Cuttriss.

A general sketch of the geological formations in Yorkshire favouring the formation of caves, with an account of the recent exploration of Troller's cave in Wharfedale and Attermire cave near Settle, a plan and section of which are given. In referring to the history of cave-exploration in Yorkshire, the work of M. Martel is not noticed.

United Kingdom—England. *Natural Science* **13** (1898): 109–114. **Dawson and Hewitt.**

Natural Gas in Sussex. By Charles Dawson.

On the Discovery of Natural Gas in East Sussex. By C. Dawson.

Note on Natural Gas at Heathfield Station (Sussex). By J. T. Hewitt, D.SC., etc.

Natural gas has been struck by two borings for water near Heathfield, in Sussex; but the extent of the supply has not been ascertained, nor the gas utilized.

United Kingdom—England. **Fox-Strangeways.**

P. Yorkshire Geol. and Polytechnic S. **13** (1898): 338–345.

Filey Bay and Brigg. By C. Fox-Strangeways. *With Plates.*

A series of five pictures showing the structure of the Yorkshire coast and the contrast in the forms of the land, due to the overlying boulder clay and the underlying Jurassic rocks of alternate limestone and compact clay.

United Kingdom—England. **Harrison.**

The Place-Names of the Liverpool District; or, the History and Meaning of the Local and River-Names of South-west Lancashire and of Wirral. By Henry Harrison. London: Elliot Stock, 1898. Size 8 × 5½, pp. 104. *Presented by the Publisher.*

United Kingdom—England. *J.R. Agricultural S.* **9** (1898): 286–316, 512–550. **Bear.**

Flower and Fruit Farming in England. By William E. Bear.

The recent great increase in the growing of flowers and fruit on a large scale has led to the inquiry here described. From the Scilly Isles—the conditions of which are fully described in the paper—no less than 514 tons of cut flowers were exported in

1896; the islands contain 503 acres under flowers, mainly narcissus. The export of flowers begins in December, and goes on until June. The Lincolnshire and Wisbech bulb-farms are also described in some detail, and the flower-growing in the neighbourhood of London is treated at length.

United Kingdom—England. *Contemporary Rev.* **74** (1898): 137–152. **Harrison.**

Ideal London. By Frederic Harrison.

This delightful lecture says much about the real character a city ought to possess, and indicates the lines of improvement practicable in the special instance selected.

United Kingdom—England. *Archæologia* **55** (1897): 409–430. **Hope.**

Excavations on the site of the Roman city at Silchester, Hants, in 1896. By W. H. St. John Hope. *With Plans and Illustrations.*

United Kingdom—England. **Joanne.**

Collection des Guides-Joanne. Londres et ses Environs. 34 Plans et 6 Cartes. Paris: Hachette et Cie, 1898. Size 6½ × 4½, pp. iv. and 374.

United Kingdom—England. **Nares.**

Report on the Present State of the Navigation of the River Mersey (1897), to the Right Honourable the Commissioners for the Conservancy of the River Mersey. By Vice-Admiral Sir G. S. Nares, K.C.B., F.R.S. London: Metchim & Son, 1898. Size 9½ × 6, pp. 16.

United Kingdom—Rainfall. **Symons and Wallis.**

British Rainfall, 1897. On the Distribution of Rain over the British Isles during the year 1897, as observed at more than 3000 stations in Great Britain and Ireland, with articles upon various branches of rainfall work. Compiled by G. J. Symons, F.R.S., and H. Sowerby Wallis. London: E. Stanford, 1898. Size 9 × 6, pp. 60 and 240. *Maps and Diagrams. Price* 10*s. Presented by the Author.*

The current issue of *British Rainfall* contains an important paper and maps on the rainfall of the Lake District.

United Kingdom—Scilly Islands. *Travel* **3** (1898): 130–135. **Denny.**

Wanderings in the Scilly Archipelago. By Professor A. Denny. *With Illustrations.*

United Kingdom—Scotland. **Ellice.**

Place-Names in Glengarry and Glenquoich and their Origin. By Edward C. Ellice. London: Sonnenschein & Co., 1898. Size 8 × 5½, pp. viii. and 128. *Illustrations and Map. Presented by the Publishers.*

United Kingdom—Shetland. *J. Manchester G.S.* **13**, 1897 (1898): 125–138. **Russell.**

The Shetland Islands. By E. J. Russell, B.Sc. *With Map.*

United Kingdom—Sugar-Beet. **Lawes and Gilbert.**

J.R. Agricultural S. **9** (1898): 344–370.

The Growth of Sugar-Beet, and the Manufacture of Sugar, in the United Kingdom. By Sir John Bennet Lawes and Sir J. Henry Gilbert.

A careful investigation into the probability of the profitable growth of the sugar-beet in Great Britain, with details of experiments which have been made. The conclusions arrived at are that it is possible to cultivate the beet in many parts of the country; but that in only a few places, such as Norfolk and Suffolk, would it be likely to prove very successful; and even there only in the case of the price of sugar exceeding £9 per ton.

United Kingdom—Tide Tables. **Harris and Goalen.**

Tide Tables for the British and Irish Ports, for the year 1899: also the Times and Heights of High Water at Full and Change for the principal places on the Globe. By Captains H. R. Harris and W. N. Goalen. London: J. D. Potter [1898]. Size 10 × 6½, pp. xl. and 262. *Price* 2*s. Presented by the Admiralty.*

ASIA.

Caspian Sea. *Naturw. Wochenschrift* **13** (1898): 433–439. **Lang.**

Der Adschidarja. Von O. Lang. *With Sketch-maps.*

On the lagoon of Ajidaria, on the east side of the Caspian.

China. *B.S.G. Marseille* **22** (1898): 5–38. **Brenier and Grosjean.**

Dix-huit mois de mission en Chine. Conférence de MM. H. Brenier et A. Grosjean. *With Map.*

China. *J. Manchester G.S.* **14** (1898): 113–129. **Bullock.**

The Geography of China. By Consul T. L. Bullock. *With Map.*

China. *Mém. (Zap.) S. Imp. Russe G.* **33** (1898): 1–38. **Lauwaert.**

Observations Barométriques faites à Hoï-Hien, au Sud de Kan-Sou, en Chine, en 1892–1893. Par M. Lauwaert. Arrangées par M. Bérézowski.

China. *B.S.R.G. d'Anvers* **22** (1898): 143–155. **Reclus.**

L'Extrême-Orient. Par M. Elisée Reclus. *With Map.*

China. *B.S.G. Com. Paris* **20** (1898): 317–338, 465–513. **Rocher.**

Notes de Voyage en Chine Centrale, D'Amoy à Han-kao.—A travers le Fou-kien, le Kiang-si, le Hou-nan et le Hou-pé. Par M. Rocher. *With Map.*

China. *Contemporary Rev.* **74** (1898): 457–473. **Younghusband.**

England's Destiny in China. By Captain F. E. Younghusband.

China—Kwang-si. *Questions Dipl. et Colon.* **5** (1898): 86–93. **Brenier.**

Notes à propos de la révolte au Kouang-Si. Par M. Brenier. *With Map.*

Refers principally to the variety of different races and classes of the people of the province, and to their social and political organization.

China—Languages. **Madrolle.**

C. Madrolle. Les Peuples et les Langues de la Chine Méridionale. Parlers de l'Ile d'Hai-Nan et de la presqu' île du Loui-tcheou (Louei-Tsiou) suivis de quelques expressions des Peuples originaires des Régions voisines du Tibet. Paris: A. Challamel, 1898. Size 10 × 6½, pp. 16. *Map.*

On the languages spoken in the south of China.

China—Manchurian Railway. ——

Russia. No. I. (1898). Despatch from Her Majesty's Ambassador at St. Petersburgh, enclosing an Agreement concluded between the Chinese Government and the Russo-Chinese Bank for the Construction of the Manchurian Railway. London: Eyre & Spottiswoode, 1898. Size 13 × 8½, pp. 10. *Price* 1½*d.*

China—Railways. *A travers le Monde, Tour du Monde* **4** (1898): 313–316. **Combes.**

Les Chemins de fer de la Chine. Par M. Paul Combes. *With Map.*

China—Wuchow. **Hosie.**

Trade of Wuchow for the year 1897. Foreign Office, Annual No. 2168, 1898. Size 10 × 6½, pp. 24. *Price* 1½*d.*

China—Yangtse. **Carles.**

The Yangtse Chiang. By W. R. Carles. (From the *Geographical Journal* for September, 1898.) Size 10 × 6½, pp. 16. *Maps.*

Dutch East Indies. **Van der Chijs.**

Nederlandsch-Indisch Plakaatboek, 1602–1811. Door Mr. J. A. Van der Chijs. Zestiende Deel. 1810–1811. 's Hage: M. Nijhoff, 1897. Size 9 × 5½, pp. 816.

Dutch East Indies. **Van der Chijs.**

Dagh-Register gehouden int Casteel Batavia vant passerende daer ter plaetse als over geheel Nederlandts-India Anno 1668–1669. Uitgegeven door het Bataviaasch Genootschap van Kunsten en Wetenschappen . . . van Mr. J. A. Van der Chijs: Batavia, 1897. Size 11 × 7½, pp. 518.

French Indo-China. *A travers le Monde, Tour du Monde* **4** (1898): 305–307. ——

L'Archipel du Tonkin. *With Illustrations.*

French Indo-China. *Globus* **74** (1898): 142–147. ——

Ein Besuch in Pnom-Penh (Kambodscha). *With Illustrations.*

India. *Engineering Mag.* **15** (1898): 797–810. **King and Hughes.**

The Gold Resources of India. By William King and Theo. W. Hughes Hughes.

India—Assam. ——

Agricultural Department, Assam. Bulletin No. 5, Agricultural Series No. 3. The Staple Crops of the Khasi and Jaintia Hills. Shillong, 1898. Size 10 × 6, pp. 20.

India—Tirah. *J. United Service I. India* **27** (1898): 227–262. **Hutchinson.**

The Story of Tirah, and the Lessons of the Campaign. By Colonel H. D. Hutchinson. *With Map.*

India—Tirah. **Hutchinson.**

The campaign in Tirah, 1897–98. An account of the Expedition against the Orakzais and Afridis under General Sir William Lockhart, G.C.B., K.C.S.I., based (by permission) on letters contributed to the *Times*. By Colonel H. D. Hutchinson. London: Macmillan & Co., 1898. Size 9½ × 6, pp. xvi. and 250. *Map, Plans, and Illustrations. Price* 8*s.* 6*d. Presented by the Publishers.*

This thrilling description of the Tirah campaign is naturally devoted mainly to the history of the military operations; but in such a country these are in very large measure dependent on the configuration, the essential details of which are made clear by a series of serviceable maps.

Japan. **Lay.**

Foreign Trade of Japan for the year 1897. Foreign Office, Annual No. 2109, 1898. Size 10 × 6½, pp. 28. *Price* 2*d.*

Japan—Yokohama. **Forster.**

Trade of Yokohama for the year 1897. Foreign Office, Annual No. 2165, 1898. Size 10½ × 6½, pp. 20. *Price* 1½*d.*

Malay Archipelago—Borneo. *J. Manchester G.S.* **13**, 1897 (1898): 165–180. **Wardrop.**

All about North Borneo, the New Ceylon. By Mr. A. Tucker Wardrop. *With Map and Illustrations.*

An elementary sketch of some facts concerning North Borneo.

Malay Archipelago—Borneo. **Van der Willigen.**

Tijds. K. Ned. Aard. Genoots. Amsterdam **15** (1898): 365–443.

Mededeelingen omtrent een reis door Borneo, van Pontianak naar Bandjermasin, langs Melawi en Kahajan, in 1894 gemaakt door P. C. van der Willigen. *With Map.*

Describes a journey in Dutch Borneo, the map showing the location of the Serah and the Mardahika Dayaks.

Malay Archipelago—Java. *B.S.G. Lille* **29** (1898): 317–346, 369–399. **Gallois.**

Une visite à l'île de Java hiver 1896-97. Par Eugène Gallois. *With Map and Illustrations.*

An account of the "sights" of Java, published in the hope of inducing other tourists to test the author's descriptions on the spot.

Malay Peninsula. **Rathborne.**

Camping and Tramping in Malaya. Fifteen Years' Pioneering in the Native States of the Malay Peninsula. By Ambrose B. Rathborne. London: Sonnenschein & Co., 1898. Size 9 × 6, pp. x. and 340. *Map and Illustrations. Price* 10*s.* 6*d. Presented by the Publishers.*

The author writes from many years' experience as a pioneer in the native states of the west of the Malay peninsula. He describes the tangled forests with their flora and fauna, discusses the resources of the region, and shows the extent to which they have been utilized, and gives interesting particulars as to the life of the natives and of the Chinese who take a leading part in the work of the settlements.

Persia. *Iz. Imp. Russ. G.S.* **34** (1898): 209–216. **Zarudnyi.**

Remarks on a journey to Persia in 1896. By N. Zarudnyi. [In Russian.]

Persia—Resht. **Churchill.**

Trade of Resht for the year 1897. Foreign Office, Annual No. 2128, 1898. Size 10 × 6½, pp. 12. *Map. Price* 4*d.*

Persia—Tehran. *Travel* **3** (1898): 140–145. **Ashley.**

Through Persia and Lower Caucasia. By Ellis Ashley. II. Tehran. *With Illustrations.*

Persian Gulf. *Globus* **73** (1898): 392–395. **Seidlitz.**

Dr. S. Marks Reisen am Persischen Meerbusen. Von N. v. Seidlitz.

From the Russian description of a journey in Persia in 1897.

Rodrigues. **Colin.**

Rodrigues. Annual Report for 1896. Colonial Reports, Annual No. 223, 1897. Size 10 × 6½, pp. 10. *Price* 1*d.*

Russia—Batum. **Stevens.**

Trade of Batoum and District for the year 1897. Foreign Office, Annual No. 2067, 1898. Size 10 × 6½, pp. 28. *Price* 2*d.*

Russia—Caucasus. *Mém. S.G. Genève* **37** (1898): 25–44. **Dingelstedt.**
Les cours d'eau du Caucase et leur action géologique. Par M. V. Dingelstedt.

Russia—Caucasus. *Vierteljahrsb. Naturforsch. Ges. Zürich* **43** (1898): 25–45. **Heim.**
Geologische Nachlese. Von Albert Heim. Nr. 9. Querprofil durch den Central-Kaukasus, längs der grusinischen Heerstrasse, verglichen mit den Alpen. *With Plate.*

Russia—Caucasus. *G.Z.* **4** (1898): 320–335. **Schmidt.**
Ein Besuch in der Petrolstadt Baku. (Nach einem Vortrag.) Von Dr. Carl Schmidt. *With Plates.*

Russia—Central Asia. *Verh. Ges. Erdk. Berlin* **25** (1898): 262–265. **Futterer.**
Herr Dr. K. Futterer: Geologische Beobachtungen am Terek-Pass.

Russia—Siberia. **Saint-Yves.**
Rev. Française **23** (1898): 329–338, 390–400, 467-480, 517–529.
D'Omsk à Vierniy. Par Georges Saint-Yves.

Russia—Siberia. *Rev. G.* **42** (1898): 417–433; **43** (1898): 13–29, 81–98. **Baye.**
De Penza à Minoussinsk, souvenirs d'une mission. Par le Baron de Baye. *With Illustrations.*

Turkey. **Longworth.**
Trade of the Trebizond and Sivas Vilayets for the year 1897. Foreign Office, Annual No. 2069, 1898. Size 10 × 6, pp. 20. *Price* 1½*d.*

Turkey—Anatolia. **Gilbertson.**
Report on the Vilayet of Broussa. Foreign Office, No. 460, Miscellaneous, 1898. Size 10 × 6½, pp. 20. *Price* 1½*d.*

Turkey—Angora. **Shipley.**
Trade of Angora and District for the year 1897. Foreign Office, Annual No. 2166. Size 10 × 6, pp. 12. *Price* 1*d.*

Turkey—Erzerum. **Graves.**
Trade of Erzeroum and District for the year 1897. Foreign Office, Annual No. 2163, 1898. Size 10 × 6, pp. 16. *Price* 1*d.*

Turkey—Syria. *Oester. Monats. Orient* **24** (1898): 75–82. **Feigl.**
Altsyrische Baukunst. Von Hermann Feigl.
On the excavations in Senjirli-Yadai, situated between Alexandretta and Marash.

Turkey—Syria. *Palestine Exploration Fund, Q. Statement* (1898): 183–205. **Glaisher.**
On the Temperature of the Air at Jerusalem, from continuous observations, 1882 to 1896, and comparison with the temperature of the air at Sarona, from simultaneous observations, 1882 to 1889. By James Glaisher, F.R.S.

Turkey—Syria. *Palestine Exploration Fund, Q. Statement* (1898): 145–154. **Schick.**
The Site of the Church of the Holy Sepulchre at Jerusalem. By Dr. Conrad Schick. *With Plan and Sections.*

AFRICA.

Abyssinia. *A travers le Monde, Tour du Monde* **4** (1898): 281–284. **Leymarie.**
Impressions d'Abyssinie. Par M. Henri Leymarie. *With Illustrations.*

Algeria. *B.S. Languedoc. G.* **21** (1898): 195–216. **Mercier.**
Vingt-huit jours chez les Tirailleurs algériens. Par M. Gaston Mercier.
On military life in the south of Algeria.

Algeria. *XVI. Jahresb. G. Ges. Bern*, 1897 (1898): 71–132. **Stockmar.**
L'Algérie en 1840. Lettres de X. Stockmar.

Algeria—Jijelli *Rev. Maritime* **137** (1898): 464–492; **138** (1898): 41–71. **Monchicourt.**
L'expédition de Djidjelli (1664). Par M. Ch. Monchicourt. *With Maps.*
A detailed account of the French military expedition to Algeria in 1664, the occupation of the seaport of Jijelli, and the subsequent withdrawal.

British Central Africa. *P. Philosoph. S. Glasgow* **29** (1898): 97–122. **Macrone.**
Railway Survey Work in the Shiré Highlands of British Central Africa, with General Observations on the Country between Chinde and Lake Nyasa. By Grieve Macrone.

British Central Africa. **Weatherley.**

Circumnavigation of Lake Bangweolo. By Paulett Weatherley. (From the *Geographical Journal* for September, 1898.) Size 10 × 6½, pp. 22. *Map and Illustrations.*

British East Africa—Uganda. **Berkeley.**

Africa. No. 10 (1898). Report by Her Majesty's Commissioner in Uganda on the Recent Mutiny of the Soudanese Troops in the Protectorate. London: Eyre & Spottiswoode, 1898. Size 13½ × 8½, pp. 20. *Map. Price* 7*d.*

British East Africa—Zanzibar. *Globus* **74** (1898): 169–173. **Werth.**

Tumbatu, die Insel der Watumbatu. Von E. Werth. *With Map and Illustrations.*

British South-West Africa. *Globus* **74** (1898): 105–110. **Passarge.**

Ein Ausflug zu den Südwestafrikanischen Guanoinseln. Von Anton Passarge.

Describes a visit in 1897 to Possession island, Halifax island, the islands of Angra Pequena, and Lüderitz bays, Ichaboe island, Mercury island, and Hollam's Bird island, of each of which a short account is given.

British West Africa—Benin. *J. Manchester G.S.* **14** (1898): 208–221. **Roth.**

A Diary of a Surgeon with the Benin Punitive Expedition. By Felix N. Roth.

Congo Railway. *B.S.R. Belge G.* **22** (1898): 305–313. ——

Le Chemin de fer du Congo.

Congo Railway. *Tour du Monde* **4** (1898): 493–504. **Lorin.**

Le Chemin de fer du Congo. Par M. Henri Lorin. *With Map and Illustrations.*

Congo Railway. *Rev. Française* **23** (1898): 583–591. **Montell.**

Le Chemin de fer du Bas-Congo. Par A. Montell. *With Maps and Illustration.*

Congo State. *Fortnightly Rev.* **64** (1898): 565–574. **Boulger.**

Twelve Years' Work on the Congo. By Demetrius C. Boulger.

A sketch of the history of the Congo Free State.

Congo State. *B.S.R.G. d'Anvers* **23** (1898): 89–110. **Dubreucq.**

Les opérations Chaltin, dans le Haut-Uellé. Par le Lieutenant R. Dubreucq.

Congo State. *B.S.R. Belge G.* **22** (1898): 245–280. **Navez.**

La reprise du Congo. Par Louis Navez.

On the origin of the Congo Free State, and the international arrangements which helped its formation.

East Africa. *M. k.k. G. Ges. Wien* **41** (1898): 449–476. **Schoeller.**

Ergebnisse meiner Expedition nach Aequatorial-Ost-Afrika und Uganda 1896–97. Von Dr Max Schoeller.

A journey in 1896–97 from Pangani to Victoria Nyanza and Uganda, returning to Mombasa. This journey is also described in the *Deutsche Kolonialzeitung* 15 (1898): 59–63, 206–207, 232–234.

Egypt—Libyan Desert. **White.**

From Sphinx to Oracle. Through the Libyan Desert to the Oasis of Jupiter Ammon. By Arthur Silva White. London: Hurst & Blackett, [1898.] Size 9 × 6, pp. xvi. and 278. *Maps and Illustrations. Price* 16*s. Presented by the Publishers.*

A journey in the early part of 1898 by camel across the Libyan desert from Cairo to Siwa.

Egypt—Sinai. *B.S. Khédiv. G.* **5** (1898): 5–35. **Fourtau.**

La côte ouest du Sinaï. Par M. R. Fourtau. *With Map.*

Egypt—Suez Canal. **Cameron.**

Trade of Port Said and Suez for the year 1897. Foreign Office, Annual No. 2170, 1898. Size 9½ × 6½, pp. 16. *Price* 1½*d.*

Egyptian Sudan. *Quarterly Rev.* **188** (1898): 546–572. ——

England and the Soudan.

Egyptian Sudan. *Contemporary Rev.* **74** (1898): 480–481. ——

General Gordon's Territories: a Facsimile of his Autograph Map. *With Map.*

Egyptian Sudan. *Contemporary Rev.* **74** (1898): 482–497. **Felkin.**

The Soudan Question. By R. W. Felkin. *With Map.*

Egyptian Sudan. **Alford and Sword.**

The Egyptian Soudan, its Loss and Recovery, including I.—A rapid sketch of the History of the Soudan. II.—A narrative of the Dongola Expedition, 1896. III.—A full account of the Nile Expeditions, 1897–8. By Henry S. L. Alford and W. Dennistoun Sword. With numerous Portraits, Illustrations, and Maps, and Records of the services of the Officers (1896–8), etc. London: Macmillan & Co., 1898. Size 9½ × 6, pp. xiv. and 336. *Price* 10*s*. *Two copies—one presented by the Authors, the other by the Publishers.*

A history of the re-conquest of the Sudan, with a short account of the exploration and occupation by the Egyptian government, and its loss. Then in full detail the narrative follows step by step the incidents of the recapture, the Dongola expedition of 1896 from the personal experience of the authors, the operations of 1897 and the expedition of 1898, compiled from trustworthy unpublished sources. The whole is illustrated with portraits, maps, and excellent diagrams of the chief battles.

Gold Coast. **Kemp.**

Nine Years at the Gold Coast. By the Rev. Dennis Kemp. London: Macmillan & Co., 1898. Size 9½ × 6, pp. xvi. and 280. *Map and Illustrations. Price* 12*s*. 6*d*. *Presented by the Publishers.*

This is a description of life in the Gold Coast colony, written in a refreshingly healthy style. The author is a missionary, singularly free from prejudice of any kind, and profoundly interested in his subject. In addition to descriptions of journeys in the "bush" of the colony proper, there is a pleasant account of a visit to Kumasi after the British force had taken possession of the Ashanti capital. The attitude of Miss Kingsley towards West African missionary work is discussed.

Lagos. **Kerr.**

Lagos. Annual Report for 1897. Colonial Reports, Annual No. 232, 1898. Size 10 × 6, pp. 10. *Price* 1*d*.

Madagascar. *C. Rd., S.G. Paris* (1898): 275–281. **Bastard.**

Voyage chez les Sakalaves du sud-ouest et chez les Bares. Par M. Bastard. *With Map.*

This journey took place in the region on the south-west of Madagascar, between the rivers Mangoky and Onilaki.

Madagascar. **Driencourt, Rollet de l'Isle, and Laporte.**

Ann. Hydrographiques (1897): 73–105.

Rapport sur les missions hydrographiques de Madagascar (1891–1895). Par MM. Driencourt, Rollet de l'Isle et Laporte. *With Maps and Plate.*

An account of the progress of the survey of the coast of Madagascar.

Madagascar. *B.S.G. Com. Bordeaux* **21** (1898): 177–200. **Fayet.**

Madagascar. Le Bouéni (Majunga). Par A. Fayet.

Madagascar. *Ann. G.* **7** (1898): 375–377. **Gautier.**

Hypsométrie de la partie septentrionale de Madagascar. Par M. Émile F. Gautier. *With Map.*

Madagascar. *B. et Mém. S. Africaine Française* (1898): 3–12. **Penant.**

Rapport à la Commission d'initiative de la Société Africaine de France sur les conséquences du rattachement à Madagascar des anciennes colonies de Diégo-Suarez, Nossi-Bé et Sainte-Marie.

Madeira. **Spence.**

Trade of Madeira for the year 1897. Foreign Office, Annual No. 2089, 1898. Size 10 × 6½, pp. 10. *Price* 1*d*.

Portuguese East Africa—Chinde. **Greville.**

Trade of Chinde for the year 1897. Foreign Office, Annual No. 2106, 1898. Size 10 × 6½, pp. 12. *Map. Price* 2½*d*.

Portuguese East Africa—Lourenço Marques. **Parminter.**

Trade of Lourenço Marques for the year 1897. Foreign Office, Annual No. 2162, 1898. Size 10 × 6½, pp. 14. *Price* 1*d*.

Red Sea. *J.R. Asiatic S.* (1898): 617–618. **King.**

The Red Sea: Why so called. By Major J. S. King.

Suggests that Himyar = Arabic *Ahmer* = red, the founder of the Himyaritic dynasty, gave name to the *Red* sea, along the borders of which his empire extended, and that the Greek derivation from "King Erythros" was merely a translation.

Royal Niger Company. **Baillaud.**

La Compagnie Royale du Niger et son évolution. Par Emile Baillaud. (Extrait, Annales de l'École Libre des Sciences Politiques. Treizième Année, No. 4, 15 Juillet 1898.) Size 10 × 6½, pp. 493–512. *Presented by the Author.*

This pamphlet is announced as an extract from a forthcoming work devoted to the study of the Royal Niger Company.

Sahara—In-Salah. *B. Comité l'Afrique Française* **8** (1898): 227–228. **Vuillot.**

A In-Salah. Par M. P. Vuillot. *With Map.*

Sierra Leone. **Elliott.**

Sierra Leone. Annual Report for 1897. Colonial Reports, Annual No. 234, 1898. Size 10 × 6½, pp. 24. *Price* 1½*d.*

Somaliland. **Vannutelli and Citerni.**

La seconda spedizione Bòttego nell' Africa orientale. Conferenza di L. Vannutelli e C. Citerni con una breve introduzione di G. Roncagli. (Estratto dalle Memorie della Società Geografica Italiana, vol. viii. p. ii., 1898.) Roma, 1898. Size 9½ × 6½, pp. 28. *Presented by Signor L. Vannutelli.*

South-East Africa. *Mém. S.G. Genève* **37** (1898): 15–23. **Grandjean.**

L'invasion des Zoulous dans le Sud-Est africain. Par M. Arthur Grandjean.

This short account of Zulu history is written by a missionary, but does not apparently refer to his personal observations.

Sudan. *Rev. Française* **23** (1898): 79–88. **Demanche.**

Les lettres de la Mission Marchand. Par G. Demanche. *With Map.*

Sudan. *Rev. Française* **23** (1898): 89–97. **Servigny.**

Le Bahr el Ghazal et ses habitants. Par J. Servigny.

Tripoli. **Dickson.**

Trade of Tripoli for the year 1897. Foreign Office, Annual No. 2048, 1898. Size 10 × 6½, pp. 10. *Price* 1*d.*

Tripoli. **Motta.**

Bollettino del Ministero degli Affari Esteri. Luglio, 1898. Turchia. La Tripolitania. Rapporto del cav. avv. Riccardo Motta. Roma, 1898. Size 9½ × 6½, pp. 64.

Tripoli. *Deutsche G. Blätter* **21** (1898): 88–110. **Grothe.**

Tripolitanien und der Karawanenhandel nach dem Sudan. Von Dr. L. H. Grothe.

Tunis. **Johnston.**

Report on the Regency of Tunis during the French Protectorate. Foreign Office, Miscellaneous, No. 447, 1898. Size 10 × 6, pp. 48. *Map. Price* 4½*d.*

Tunis. *Miss. Catholiques* **30** (1898): 316–318, 333–336. **Neu.**

Béja (Tunisie). Par M. Neu. *With Illustrations.*

West Africa—Benin Art. **Roth.**

Notes on Benin Art. By H. Ling Roth. Also Note on the finding of some of the Metal and other Art Work in Benin City. By Felix N. Roth. (Reprinted from the *Reliquary and Illustrated Archæologist*, July, 1898.) Size 10½ × 7½, pp. 14. *Illustrations. Presented by the Author.*

Mr. Ling Roth is not inclined to believe that the curious art work of Benin was of Portuguese introduction. He thinks it was of earlier origin, possibly coming from Egypt, although the Portuguese invasion undoubtedly influenced it.

West Africa—Niger. *B. Comité l'Afrique Française* **8** (1898): 207–218. ——

La convention du Niger. *With Map.*

West Africa—Niger. *Questions Dipl. et Colon.* **4** (1898): 273–280, 321–329. **Étienne.**

La convention franco-anglaise du Niger. Par M. Étienne. *With Maps.*

West Africa—Niger. *Deutsche Kolonialz.* **15** (1898): 227–230. **Vohsen.**

Das englisch-französische Abkommen in Westafrika vom 14 Juni 1898. Von E. Vohsen. *With Maps.*

West Africa—Niger. *B.S.G. Lille* **29** (1898): 109–141. **Voulet and Chanoine.**

Dans la Boucle du Niger. Par Capitaine Voulet et Lieut. Chanoine. *With Map and Plates.*

Western Sudan. *Nineteenth Century* **44** (1898): 79–91. **Robinson.**

Civilisation in the Western Soudan. By the Rev. Canon C. H. Robinson.

NORTH AMERICA.

American Race. **Wilson.**

The Antiquity of the Red Race in America. By Thomas Wilson.—Report of the U.S. National Museum for 1895. Washington, 1897. Pp. 1039–1045.

A chain of theoretical argument which culminates in the conclusion "that the migration by which the American race came to occupy the western hemisphere could not have been less than two thousand years prior to the Christian era, but that, if they came from other countries, they might have come a long time before."

Canada. **Tyrrell.**

Across the Sub-Arctics of Canada, a Journey of 3200 miles by canoe and snow-shoe through the Barren Lands. By J. W. Tyrrell. Including a List of Plants collected on the Expedition, a Vocabulary of Eskimo Words, a Route Map, and full classified Index. With Illustrations from Photographs taken on the journey, and from drawings by Arthur Heming. London: T. Fisher Unwin [*not dated*]. Size 9 × 6, pp. 280. *Price* 7*s.* 6*d.*

A journey in 1893 north-eastward along the Athabasca river and lakes to Chesterfield inlet, returning along the west shore of Hudson bay.

Canada and Alaska. *B.S.G. Com. Paris* **20** (1898): 339–360, 514–529. **Serre.**

Les terrains auriferes dans le Canada et l'Alaska. Par M. P. Serre. *With Maps.*

Canada—British Columbia. **Boas.**

The Social Organization and the Secret Societies of the Kwakiutl Indians. By Franz Boas. Based on personal observations and on notes made by Mr. George Hunt.—Report of the U.S. National Museum for 1895. Washington, 1897. Pp. 311–738. *Illustrations.*

Canada—British Columbia. *Deutsche Rundschau G.* **21** (1898): 13–17. **Habel.**

Das North-Forkthal in Britisch-Columbien. Von Jean Habel. *With Illustration.*

On the valley of the North Fork of the Wapta or Kicking Horse river.

Canada—Crofter Colonization. ——

Eighth Report of Her Majesty's Commissioners appointed to carry out a scheme of Colonization in the Dominion of Canada of Crofters and Cottars from the Western Highlands and Islands of Scotland; with Appendices. London: Eyre & Spottiswoode, 1897. Size 13½ × 8½, pp. 12. *Price* 1½*d.*

Canada—Labrador. **Low.**

Report on a traverse of the Northern part of the Labrador Peninsula from Richmond Gulf to Ungava Bay. By A. P. Low.—Geological Survey of Canada. Part L. Annual Report, vol. ix. Ottawa, 1898. Size 10 × 7, pp. 44. *Illustrations.*

The official account of Mr. Low's important journey in northern Labrador.

Canada—New Brunswick. **Kain.**

List of recorded Earthquakes in New Brunswick. Compiled from Published Works and from Private Information. By Samuel W. Kain. Reprinted from Bulletin xvi. of the Natural History Society of New Brunswick. St. John, N.B., 1898. Size 9 × 6, pp. [8.] *Presented by the Author.*

Canada—N.W.T. *Church Miss. Intelligencer* **49** (1898): 656–662. **Stringer, etc.**

Within the Arctic Circle. Letters from the Bishop of Mackenzie river and the Rev. I. O. Stringer.

Canada—Nova Scotia. **Bailey.**

Report on the Geology of South-West Nova Scotia, embracing the counties of Queens, Shelburne, Yarmouth, Digby, and part of Annapolis. By L. W. Bailey, PH.D.—Geological Survey of Canada. Part M. Annual Report, vol. ix. Ottawa, 1898. Size 10 × 7, pp. 154. *Map.*

Canada—Ontario. **Bell.**

Report on the Geology of the French River Sheet, Ontario. By Robert Bell, M.D.—Geological Survey of Canada. Part I. Annual Report, vol. ix. Ottawa, 1898. Size 10 × 7, pp. 30. *Map.*

CENTRAL AND SOUTH AMERICA.

Argentine Republic. **Church.**

Argentine Geography and the Ancient Pampean Sea. By Colonel George Earl Church. From the *Geographical Journal* for October, 1898. Size 10 × 6½, pp. 16. *Maps and Sections.*

Argentine Republic. **Laing.**

Trade of the Argentine Republic for the year 1897. Foreign Office, Annual No. 2044, 1898. Size 10 × 6½, pp. 20. *Price* 1½*d.*

Bolivia. **Ballivian and Zarco.**

Monografías de la Industria Minera. I. El Oro en Bolivia. Por Manuel V. Ballivián y José Zarco. La Paz, 1898. Size 8½ × 5½, pp. 248. *Map. Presented by M. V. Ballivian.*

On the gold resources of Bolivia.

Bolivia. **Ballivian and Saavedra.**

Oficina Nacional de Inmigración, Estadistica y Propaganda Geográfica. Monografias de la Industria Minera. II. El Cobre en Bolivia. Por Manuel V. Ballivian y Bautista Saavedra. La Paz, 1898. Size 8½ × 6, pp. 68. *Map. Presented by the Authors.*

On the resources in copper of Bolivia.

Bolivia. **Cisneros and Garcia.**

Geografia Comercial de la América del Sur. Por Carlos B. Cisneros y Romulo E. Garcia. Tercera Entrega. República de Bolivia. Lima: Imprenta y Libreria de San Pedro, 1897. Size 8½ × 6, pp. 101–232.

Brazil. **Bernal.**

Trade of Rio Grande do Sul and of Porto Alegre for the year 1897. Foreign Office, Annual No. 2080, 1898. Size 10 × 6½, pp. 34. *Price* 5*d.*

Brazil and French Guiana. *Globus* **74** (1898): 147–150. **Katzer.**

Der streitige Golddistrikt von Brasilianisch-Guyana. Von Dr. F. Katzer.

British Guiana. ——

British Guiana. Report of the Council of the Institute of Mines and Forests, on the Gold and Forest Industries of British Guiana, for the year ending 30th June, 1898. Georgetown, Demerara; Printed by Baldwin & Co., 1898. Size 13½ × 8½, pp. 24.

British Guiana. **Cox.**

British Guiana. Annual Report for 1896–7. Colonial Reports, Annual No. 222, 1897. Size 10 × 6½, pp. 24. *Price* 1½*d.*

British Guiana and Venezuela. **Phillips.**

Guiana and Venezuela Cartography. By P. Lee Phillips. (From the Annual Report of the American Historical Association for 1897, pp. 681–776.) Washington, 1898. Size 9½ × 6. *Presented by the Author.*

A list of the maps showing the Venezuela and British Guiana boundary.

Central America **Trayner.**

Report on the Legal Status of Foreign Residents in Central America. Foreign Office, Miscellaneous, No. 476, 1898. Size 10 × 6½, pp. 36. *Price* 2½*d.*

This is an important report dealing with the laws affecting foreigners in the Central American Republics, and giving extracts from the constitutions of the republics. The naturalisation laws in particular deserve notice, on account of the number of ways in which a foreigner may become automatically naturalized, perhaps without his own knowledge.

Chile. *Verh. Ges. Erdk. Berlin* **25** (1898): 324–328. **Krüger.**

Herr Dr. Paul Krüger: Ueber die Erforschung des Rio Corcovado.

Chile—Andes. **Philippi.**

Sobre el verdadero significado de la palabra Cordillera. Por Dr. R. A. Philippi. Santiago de Chile, 1898. Size 7 × 5, pp. 10.

Chile—Boundary Question. ——

The Chilian Boundary Question. Three maps showing: 1. Extent of the Surveys made by the Chilian and the Argentine Demarcation Commissions from 1892–1896; 2. The Surveys effected from 1892 up to date by the Chilian Demarcation Commissions; 3. The Surveys effected from 1892 up to date by the Argentine Demarcation Commissions. (From the *Standard*, Buenos Aires, July 11, 1898.)

Chile—Juan Fernandez. *Globus* **74** (1898): 235–238. **Polakowsky.**

Neues von der Robinson-Insel. Von Dr. H. Polakowsky. *With Illustrations.*

Colombia—Panama. **Mallet.**

Trade of Panama and District for the year 1897. Foreign Office, Annual No. 2088, 1898. Size 10 × 6½, pp. 26. *Price 2d.*

Cuba. **Rowan and Ramsey.**

The Island of Cuba; a descriptive and historical account of the "Great Antilla." By Andrew Summers Rowan and Marathon Montrose Ramsey. London: Gay & Bird, 1898. Size 7 × 5, pp. x. and 280. *Maps. Price 6s.*

A description of Cuba written in 1896.

AUSTRALASIA AND PACIFIC ISLANDS.

British New Guinea. **Macgregor.**

Annual Report on British New Guinea, from July 1, 1896, to June 30, 1897. With Appendices. Brisbane, 1898. Size 13½ × 8½, pp. xxvi. and 96. *Maps and Illustrations.* British New Guinea. Annual Report for 1896-97, Colonial Reports, Annual No. 237, 1898. Size 10 × 6½, pp. 48. *Price 2½d.*

The individual reports here collected have been referred to in the *Journal* from time to time as they appeared.

Ladrone Islands. *B.S.G. Com. Havre* **15** (1898): 49–61, 65–96. **Marche.**

Note de voyage sur les îles Mariannes. Par M. Alfred Marche.

New Hebrides. *Deutsche G. Blätter* **21** (1898): 110–112. **Greffrath.**

Die Neu-Hebriden. Von H. Greffrath.

New Zealand. *T. and P. New Zealand I.* **30**, 1897 (1898): 33–41. **Best.**

Tuhoe Land: Notes on the Origin, History, Customs, and Traditions of the Tuhoe or Urewera Tribe. By Elsdon Best.

New Zealand. **Smith.**

Report of the Department of Lands and Survey, New Zealand, for the year 1897-98. By Stephenson Percy Smith, Surveyor-General. Wellington, 1898. Size 13½ × 8½, pp. xxii. and 252. *Maps and Plates.*

This report is illustrated by numerous photographs, plans, and maps, showing the progress of the survey of New Zealand, the public works, and the transactions in land.

New Zealand—Hawke's Bay. *T. and P. New Zealand I.* **30**, 1897 (1898): 515–531. **Hill.**

On the Hawke's Bay Plain: Past and Present. By H. Hill.

A sketch of the geological evolution of Hawke's bay, and details of the configuration of the plain which surrounds it, with special regard to the floods following severe storms, and suggestions as to the preservation of the district from their effects.

Pacific Islands. *Ann. Hydrographiques* (1897): 59–61. ——

Déterminations des positions géographiques dans les possessions Allemandes de l'océan Pacifique.

An account of the methods and statement of the results of longitude determinations by Dr. Hayn, of Leipzig, in 1895, in the German Pacific Possessions.

Pleasant Island. *Globus* **74** (1898): 153–158. **Krämer.**

Nauru: Ein Besuch der Insel. Von Dr. Augustin Krämer. *With Illustrations.*

Nauru, or Pleasant island, lies in 0° 27′ S. and 167° E., far from any other islands. Photographs show views of the cliff of upraised reef which surrounds the island, and of the people.

Queensland. *P.R.S. Queensland* **13** (1898): 39–50. **Roth.**

Notes on Social and Individual Nomenclature among certain North Queensland Aboriginals. By Walter E. Roth.

Queensland—Almanac and Directory. **Pugh.**

Pugh's Almanac and Queensland Directory for 1898. Brisbane: Gordon & Gotch, 1898. Size 7½ × 5, pp. 594 and 520. *Map, Plan, and Illustrations. Presented by the Queensland Government.*

This is at once an almanac and gazetteer, supplying the fullest information on all matters regarding Queensland.

Rotuma. *J. Anthrop. I.* **27** (1898): 396–435, 457–524. **Gardiner.**

The Natives of Rotuma. By J. Stanley Gardiner, B.A. *With Illustrations.*

Tasmania. ——

Tasmania and its Mineral Wealth. Issued as a Special Edition of the Australian Mining Standard, July 1, 1898. Melbourne and Sydney. Size 15 × 10, pp. 92. *Illustrations. Price* 1*s. Presented by J. Easton, Esq.*

Tonga. **Leefe.**

Trade of Tonga for the year 1897. Foreign Office, Annual No. 2174, 1898. Size 10 × 6½, pp. 8. *Price* ½*d.*

West Australia. *Ann. Hydrographie* **26** (1898): 256–258. ——

Der Hafen von Fremantle in Westaustralien. *With Plan.*

Western Australia. ——

Western Australia. Department of Mines. Gold Mining Statistics, 1897. Size 13 × 8½, pp. 124.

Western Australia. **Hope.**

Western Australia: the South-Western Districts. Written by Geo. Hope. Supplement to the *Geraldton Express.* Size 17½ × 11½, pp. 72. *Illustrations.*

These supplements give an excellent account of the present condition and industries of Western Australia, especially of the timber trade.

Western Australia. **Maitland.**

Western Australia. Geological Survey. Bulletin No. 1. Bibliography of the Geology of Western Australia. By A. Gibb Maitland. Perth, 1898. Size 8½ × 5½, pp. 32. *Presented by the Government Geologist.*

Western Australia. ——

Western Australia. Department of Lands and Surveys. Report by the Surveyor-General for the year 1897. Perth, 1898. Size 13½ × 8½, pp. 46. *Maps. Presented by the Surveyor-General, W. Australia.*

Western Australia—Abrolhas Island. **Helms.**

Houtman's Abrolhas. By R. Helms. (From the *Producers' Gazette, and Settlers' Record*, Western Australia, vol. v. part 6, June, 1898, pp. 409–431.) *Map and Illustrations.* Perth, 1898. Size 10 × 6½.

POLAR REGIONS.

Antarctic. **Fricker.**

Antarktis. Von Dr. Karl Fricker.—Bibliothek der Länderkunde, herausgegeben von Alfred Kirchhoff und Rudolf Fitzner. Band i. Berlin: Schall & Grund, 1898. Size 10½ × 7, pp. vi. and 230. *Maps and Illustrations. Two copies—one presented by the Author, the other by the Publishers.*

An account of the history of antarctic exploration, with very attractive illustrations, followed by a summary of all that is known of the antarctic regions.

Arctic—Spitsbergen. **Conway.**

An Exploration in 1897 of some of the Glaciers of Spitsbergen. By Sir W. Martin Conway. (From the *Geographical Journal* for August, 1898.) Size 10½ × 6½, pp. 22. *Map and Illustrations.*

Eskimo Art. **Hoffman.**

The Graphic Art of the Eskimos. Based upon the Collections in the National Museum. By Walter James Hoffman, M.D.—Report of the U.S. National Museum for 1895. Washington, 1897. Pp. 739–968. *Map and Illustrations.*

Greenland. **Peary.**

Northward over the "Great Ice." A Narrative of Life and Work along the Shores and upon the Interior Ice-cap of Northern Greenland in the years 1886 and 1891–1897: with a description of the little tribe of Smith-Sound Eskimos, the most northerly human beings in the World, and an account of the Discovery and bringing home of the "Saviksue," or great Cape-York Meteorites. By Robert E. Peary. 2 vols. London: Methuen & Co., 1898. Size 9½ × 7, pp. (vol. i.) lxxx. and 522; (vol. ii.) xiv. and 626. *Portraits, Maps, and Illustrations. Price* 32*s. Presented by the Publishers.*

This important work is noticed in the *Journal* for November, p. 498.

MATHEMATICAL GEOGRAPHY.

Cartography—Projections. *Ann. Hydrographie* **26** (1898): 359–362. **Matthieu.**

Eine neue Anwendung der orthographischen Aequatorialprojektion in der Nautik. Von P. Matthieu. *With Illustration.*

Marine Surveying. *B.S.G. de l'Est* (1898): 90–112. **Thoulet.**

Comment se fait une carte marine (Promenades sur terre et sur mer en Bretagne). Par M. J. Thoulet. *With Illustrations.*

A very popular description of the preparation of a marine chart, interspersed with the record of a trip along the coast of Brittany.

Time-reckoning. *Rev. Scientifique* **10** (1898): 457–461. **Sarrauton.**

L'heure décimale et la date universelle. Par M. H. de Sarrauton.

Time Standard. *J. Manchester G.S.* **14** (1898): 24–35. **Greenwood.**

Unification of Time at Sea. By Captain W. Nelson Greenwood. *With Illustration.*

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Geomorphology. *Sitz. k. A.W. Wien* **107**, Abth. I. (1898): 89–102. **Suess.**

Ueber die Asymmetrie der nördlichen Halbkugel. Von E. Suess.

Glaciers. **Richter.**

Commission Internationale des Glaciers. Les variations périodiques des Glaciers. Troisième Rapport 1897, rédigé par E. Richter. Extrait des *Archives des Sciences physiques et naturelles*, t. vi., 1898. Genève: Georg & Cie., 1898. Size 9½ × 6½, pp. 51–84.

Loess. *American J. Sci.* **6** (1898): 299–304. **Keyes.**

Eolian Origin of Loess. By Chas. R. Keyes.

Putting forward arguments for the possible formation by wind of the loess of the Mississippi valley, the origin of which is usually assigned to the action of water by American geologists.

Meteorology. *C. Rd.* **127** (1898): 251–253. **Poincaré.**

Sur le tourbillon polaire. Note de M. A. Poincaré.

This paper claims a large share for lunar attraction in influencing the circulation of the atmosphere, and consequently the climate near the poles.

Meteorology. *Quarterly J.R. Meteorolog. S.* **24** (1898): 180–206. **Rawson.**

Anticyclonic Systems and their Movements. By Major Herbert E. Rawson. *With Diagrams.*

This paper refers to the areas of high atmospheric pressure over the globe, and to the smaller anticyclones of a more temporary kind.

Meteorology. *Meteorolog. Z.* **15** (1898): 249–261. **Trabert.**

Die Temperaturabnahme mit der Höhe in den niederösterreichischen Kalkalpen. Von Dr. Wilhelm Trabert.

An exhaustive comparison of long-period temperature means to bring out the average change of temperature with height for each month of the year for the lee and weather sides of the mountains.

Meteorology—Atmospheric Circulation. **Schaw.**

T. and P. New Zealand I. **30**, 1897 (1898): 465–476.

Notes on the Vertical Component of the Motions of the Earth's Atmosphere. By Major-General Schaw, C.B.

An important paper pointing out the importance of studying the vertical component of atmospheric movement in the winds of ordinary cyclonic and anticyclonic systems, and advocating the use of balanced wind-vanes capable of setting themselves to the true direction of the wind, and not confined to movement in a horizontal plane.

Meteorology—Dust. *Ann. Hydrographie* **26** (1898): 246–254. ———

Bericht über auf dem Meere beobachtete Staubfälle.

Reports of a number of cases of dust-falls being observed at sea on German ships.

Meteorology—Maps. *Rev. Scientifique* **10** (1898): 321–325. **De Saussure.**

Les cartes météorologiques. Par M. René de Saussure. *With Illustrations.*

This paper illustrates a method of representing on maps the lines of atmospheric movement over a whole country, in place of merely placing arrows here and there to show the direction of the wind. A specimen map is given.

Meteorology—Ocean Rainfall. *J. Manchester G.S.* **14** (1898): 36–56. **Black.**

Ocean Rainfall by Rain-Gauge Observations at Sea—1864–75–81. General and Special Oceans. By W. G. Black. *With Chart.*

This elaborate paper contains a series of tables giving estimates of the annual rainfall and number of rainy days in various zones of each ocean, with a chart showing the zones adopted.

Meteorology—Pressure. *Sitzb. k. A. W. Wien* **107**, Abth. IIa. (1898): 63–159. **Hann.**
Weitere Beiträge zu den Grundlagen für eine Theorie der täglichen Oscillation des Barometers. Von J. Hann.

The discussion of a great mass of observations of the diurnal range of the barometer, leading to a revision of the formula for representing the diminution with increasing latitude of the amplitude of the semidiurnal barometric wave.

Meteorology—Pressure. **Hann.**
Weitere Beiträge zu den Grundlagen für eine Theorie der täglichen Oscillation des Barometers. Von J. Hann. (Aus den Sitzungsberichten der kaiserl. Akademie der Wissenschaften in Wien. Mathem.-naturw.-Classe; Bd. cvii. Abth. ii. a. Jänner 1898.) Wien, 1898. Size 10 × 6¼, pp. 98.

Meteorology—Typhoons. *Meteorolog. Z.* **15** (1898): 332–341. **Doberck and Bergholz.**
Die Taifune in den ostasiatischen Gewässern nach Doberck: The Laws of Storms (Hongkong 1898). Uebersetzt und redigirt von Dr. Paul Bergholz.

Ocean Depths. ———
List of Oceanic Depths and Serial Temperature Observations received at the Admiralty during the year 1897, from H.M. Surveying ships, Indian Marine Survey, and British Submarine Telegraph Companies. Hydrographic Department, Admiralty, London, February, 1898. London: J. D. Potter, 1898. Size 13½ × 8½, pp. 60. *Price* 5*s.* 6*d.*

Oceanography. *Scottish G. Mag.* **14** (1898): 416–425, 465–479. ———
Recent Hydrographic Research in the North and Baltic Seas.

Oceanography. *Nature* **58** (1898): 200–204. **Monaco.**
Some Results of my Researches on Oceanography. By Albert, Prince of Monaco. *With Illustrations.*

Oceanography. **Wandel and Ostenfeld.**
Iagttagelser over Overfladevandets Temperatur, Saltholdighed og Plankton paa islandske og grønlandske Skibsrouter i 1897. Af C. F. Wandel og C. Ostenfeld, Kjøbenhavn, 1898. Size 9 × 6, pp. 50. *Charts.*

A useful contribution to practical oceanography, being a record of observations of temperature, salinity, and plankton of the surface waters between the Shetland Islands and Iceland or Greenland, made on board the Danish steamers during 1897. The work was in connection with Professor Pettersson's scheme for international research.

Oceanography—Tide. *C. Rd.* **126** (1898): 1613–1615. **Partiot.**
De la propagation et de la déformation de l'onde-marée qui remonte dans les fleuves. Mémoire de M. Partiot.

Rivers. *Rev. G. Italiana* **5** (1898): 201–205. **Bertolini.**
Ancora della Linea e dei fiumi di Resorgiva del Prof. G. L. Bertolini.

Specific Heat of Rocks. *Atti R.A. Lincei, Rendiconti* **7** (1898): 61–68. **Morano.**
La conduttività termica nelle rocce della campagna romana. Misura dei calori specifici e delle densità. Nota del dott. Francesco Morano.

The determination of the specific heat of rocks is of much importance with regard to the range of atmospheric temperature.

Speleology. *Rev. Scientifique* **9** (1898): 682–690. **Martel.**
La Spéléologie. Par M. E. A. Martel. *With Illustrations.*

Terrestrial Magnetism. *Ann. Hydrographie* **26** (1898): 267–270. **Nippoldt.**
Neue allgemeine Erscheinungen in der täglichen Variation der erdmagnetischen Elemente. Von A. Nippoldt jun. *With Diagram.*

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Commercial Geography. *Nineteenth Century* **44** (1898): 718–723. **Hurd.**
Coal, Trade, and the Empire. By Archibald S. Hurd.

On coaling-stations and their importance in maintaining ocean routes.

Commercial Geography—Indiarubber. *Kew B.* (1898): 241–277. ———
Para Rubber. *With Diagram and Illustrations.*

Historical—Dacia. *Archæologiai Értesitö* 17 (1897): 391-394. **Ornstein.**

Une route inconnue en Dacie du géographe de Ravenna. Par J. Ornstein. [In Hungarian.]

Historical—Travel. *B.S.G. Română* 19 (1898): 134-159. **Lahovari.**

Călĕtoria unuĭ boier Rumân în Europa la anul 1770. De Grigore Joan Lahovari.

On the travels in Europe of a Wallachian noble named Romani in 1770, the author of a book which was translated by J. F. Mayer, and published at Nuremberg in 1775.

Historical—Marco Polo. ——

The Story of Marco Polo. London: John Murray, 1898. Size 8½ × 6, pp. xiv. and 248. *Illustrations. Price* 6*s. Presented by the Publisher.*

The story of Marco Polo is told by means of a series of carefully selected extracts from Yule's 'Book of Ser Marco Polo,' connected into a continuous narrative and explained for the special benefit of young people by Mr. Noah Brooks.

Historical—Vasco da Gama. **Moreira de Sá.**

De Portugal á India. A Viagem de Vasco da Gama. Trechos que mais se prendem com o assumpto, tirados do poema de Luiz de Camões "Os Lusiadas" acompanhados de versões em Hespanhol, Italiano, Francez, Allemão e Inglez e colligidos por Ernesto Moreira de Sá. Lisboa, 1898. Size 10 × 7, pp. 494. *Map and Plates. Presented by the Author.*

This remarkable piece of work consists of a series of apposite quotations from the Lusiads in the original Portuguese, each stanza accompanied by translations in Spanish, Italian, French, German, and English. The revision of the proofs seems to have been most thorough, and we have not noticed a single misprint in the English section.

Historical—Vasco da Gama. *J.R. Asiatic S.* (1898): 589-604. **Reade.**

Vasco da Gama. By H. Reade.

Historical—Vasco da Gama. *Verh. Ges. Erdk. Berlin* 25 (1898): 215-243. ——

Fest-Sitzung zur Feier des siebzigjährigen Bestehens der Gesellschaft für Erdkunde zu Berlin am 25. Mai 1898, verbunden mit der vierhundertjährigen Gedenkfeier der Entdeckung des Seeweges nach Ost-Indien durch Vasco da Gama.

Historical—Vasco da Gama. **Hümmerich.**

Vasco da Gama und die Entdeckung des Seewegs nach Ostindien. Auf Grund neuer Quellenuntersuchungen dargestellt von Dr. Franz Hümmerich. München: O. Beck, 1898. Size 9½ × 6½, pp. xiv. and 204. *Portrait.*

History of Exploration. **Barth.**

Die von 1865-1895 erzielten Fortschritte der Kenntnis fremder Erdteile in ihren Einwirkungen auf das staatliche und wirtschaftliche Leben des Deutschen Reiches. Inaugural-Dissertation, der hohen philosophischen Fakultät der Universität Leipzig zur Erlangung der Doktorwürde vorgelegt von Christian G. Barth. Size 8 × 6, pp. xvi. and 184. *Presented by Prof. Ratzel.*

A summary of the exploring work of the last thirty years.

History—Tasman's Journal. **Heeres.**

Abel Janszoon Tasman's Journal of his Discovery of Van Diemens Land and New Zealand in 1642, with documents relating to his exploration of Australia in 1644, being Photo-Lithographic Facsimiles of the Original Manuscript in the Colonial Archives at the Hague, with an English Translation and Facsimiles of Original Maps, to which are added Life and Labours of Abel Janszoon Tasman, by J. E. Heeres, LL.D., Professor at the Dutch Colonial Institute, Delft, and observations made with the compass on Tasman's Voyage by Dr. W. Van Bemmelen, Assistant Director of the Royal Meteorological Institute, Utrecht. Amsterdam: F. Muller & Co., 1898. Size 18 × 12. *Price* £5 10*s.*

Political Geography. *Rev. G.* 43 (1898): 7-12. **Drapeyron.**

L'équilibre intercontinental. Les États-Unis et l'Espagne. Les puissances Coloniales. Par L. Drapeyron.

Political Geography. **Melville.**

Views of Commodore George W. Melville, Chief Engineer of the Navy, as to the Strategic and Commercial Value of the Nicaraguan Canal, the future control of the Pacific Ocean, the Strategic Value of Hawaii, and its Annexation to the United States. Washington, 1898. Size 9½ × 6, pp. 34. *Presented by the Author.*

Political Geography. *Z. Ges. Erdk. Berlin* **33** (1898): 126–140. **Schlüter.**

Die Grundgedanken aus Friedrich Ratzel's "Politischer Geographie." Von Dr. Otto Schlüter.

BIOGRAPHY.

Bertuch. *Deutsche Rundschau G.* **21** (1898): 38–42. **Wolkenhauer.**

Friedrich Justin Bertuch. Von W. Wolkenhauer. *With Portrait.*

Bertuch was born in 1747, in Weimar, and in 1798 commenced the publication of the first geographical journal under the title of *Allgemeinen Geographischen Ephemeriden*. He died in 1822.

Eden. **Steiner.**

Johns Hopkins University Studies in Historical and Political Science. Series XVI. Nos. 7–8–9. Life and Administration of Sir Robert Eden. By Bernard C. Steiner. Baltimore, 1898. Size 9½ × 6½, pp. 142. *Portrait.*

Emin Pasha. **Schweitzer.**

Emin Pasha, his Life and Work. Compiled from his Journals, Letters, Scientific Notes, and from Official Documents by Georg Schweitzer, with an Introduction by R. W. Felkin, M.D. 2 vols. London: A. Constable & Co., 1898. Size 9 × 6, pp. (vol. i.) xliv. and 330; (vol. ii.) viii. and 340. *Map and Portrait. Price* 32*s*. *Presented by the Publishers.*

Gardner. *Imp. and Asiatic Quarterly Rev.* **6** (1898): 283–299. **Goldsmid.**

Alexander Gardner: Soldier and Traveller. By Major-General Sir Frederic I. Goldsmid, K.C.S.I., etc.

GENERAL.

Bern Geographical Society. *XVI. Jahresb. G. Ges. Bern*, 1897 (1898): 3–57. **Graf.**

Die geographische Gesellschaft in Bern, 1873–1898, Ein Rückblick gelegentlich der Feier des 25 jährigen Bestehens der Gesellschaft von Prof. Dr. J. H. Graf.

Bibliography. ———

Bulletin de la Société Languedocienne de Géographie. Deuxième Table Décennale (1888–1897), Tomes xi. à xx. Montpellier, 1898. Size 10 × 6½, pp. 14.

Bibliography. ———

Register zu den Bänden 101 bis 105 der Sitzungsberichte der Mathematisch-Naturwissenschaftlichen Classe der kaiserlichen Akademie der Wissenschaften. XIV. Wien, 1897. Size 10 × 6½, pp. 144. *Presented by the Academy.*

An index in one alphabet to subjects and authors in the last five volumes of the reports of the mathematical and natural science section of the Vienna Academy.

Bibliography. **Bolton.**

A Catalogue of Scientific and Technical Periodicals, 1665–1895, together with Chronological Tables and a Library Check-List. By Henry Carrington Bolton. Second Edition, 1897.—Smithsonian Miscellaneous Collections. Vol. xl. Washington, 1898. Size 10 × 6½, pp. 1248.

This valuable catalogue, in addition to an alphabetical catalogue, gives a chronological table showing the dates of all the volumes of each periodical and the various series, an index of the subjects to which the periodicals refer, and an index of the libraries in the United States and Canada, where they are to be found.

Bibliography. *Rev. Scientifique* **10** (1898): 325–331. **Sauvage.**

Classification bibliographique décimale. Par M. Ed. Sauvage.

This scheme includes a specimen of a classification of geography.

Bibliography of Geography. ———

Bibliographie de 1897. 7e Bibliographie Annuelle.—Annales de Géographie. No. 35.—7e Année, 15 Septembre 1898. Paris: A. Colin & Cie. Size 10 × 6½, pp. 296.

The bibliography continues to give lists and brief abstracts of the chief geographical papers of the year, carefully selected and classified.

Church Missionary Society. ———

Proceedings of the Church Missionary Society for Africa and the East. Ninety-ninth year, 1897–98. London: Church Missionary House, 1898. Size 8½ × 6, pp. lxxx., 462, and 380. *Maps. Presented by the Church Missionary Society.*

Education—Methods. *B.S.R. Belge G.* **22** (1898): 281–294. ———

L'enseignement-supérieur de la Géographie en Belgique.

An article written with particular reference to the foundation of the Institute of Geography by Prof. Reclus, but also referring to the existing state of geographical teaching in Belgium.

Geography as a Science. *B.S. Topographie France* **22** (1898): 11–22. **Drapeyron.**

De la Coordination en géographie. Par M. Ludovic Drapeyron.

Geography as a Science. *B.S. Languedoc. G.* **21** (1898): 1–10. **Rouville.**

La géographie inspiratrice de théories géologiques, ou influence des milieux géographiques sur les conceptions scientifiques. (Extrait d'une allocution à la Société d'Études d'Histoire naturelle de Nimes.) Séance anniversaire du 11 décembre 1897. Par M. Paul de Rouville.

Health. **Harford-Battersby.**

Health in Africa. By Dr. C. F. Harford-Battersby. An Address given at the Annual Meeting of Livingstone College, November 25.

Language—Chi-nyanja. **Caldwell.**

Chi-nyanja Simplified. By R. Caldwell. Second Edition—with Key. London: the Zambesi Industrial Mission. Size 5½ × 4¼, pp. 88 and 46. *Presented by the Author.*

This is a very clear lesson-book of what appears to be a remarkably simple language.

Library Conference. ———

Transactions and Proceedings of the Second International Library Conference, held in London, July 13–16, 1897. London: Printed for Members of the Conference, 1898. Size 12½ × 8½, pp. x. and 288.

Local Geography. *B.S. Topographie France* **22** (1898): 65–79. **Fauvel.**

Documents géographiques manuscrits (textes et cartes) existant dans les Bibliothèques publiques et les Archives des départements des communes ou des particuliers. Archives de l'Administration des contributions directes et du cadastre, des départements et des communes. Cadastres et documents annexés. Par M. E. Fauvel.

On the value of the geographical records preserved in the public archives of France.

Maps. ———

Catalogus der Land- en Zeekaarten toebehoorende aan het Koninklijk Instituut voor de Taal-, Land- en Volkenkunde van Nederlandsch- Indië. s-Gravenhage, M. Nijhoff, 1898. Size 10 × 6½, pp. 86.

Maps. **Phillips.**

The value of Maps in Boundary Disputes, especially in connection with Venezuela and British Guiana. By P. Lee Phillips. Size 9½ × 6, pp. [8]. *Presented by the Author.*

This paper is the result of the argument from ancient maps employed in the dispute between Venezuela and British Guiana. It lays stress on the small number of original maps in existence, and on the prevalence of unacknowledged copying.

Museums. **(Hoyle.)**

The Manchester Museum, Owens College. Report for the year 1897–98. Publication 23. Manchester: J. E. Cornish, 1898. Size 10 × 6½, pp. 64. *Price* 6*d.* *Presented by the Manchester Museum.*

This report contains an account of the principal museums in North America.

Pacific Cable. *Fortnightly Rev.* **64** (1898): 422–428. **Bright.**

An All-British, or Anglo-American, Pacific Cable. By Charles Bright. *With Map.*

The map shows the existing and projected submarine cables, and a number of the more important overland lines.

Royal Society—Record. ———

The Record of the Royal Society of London. 1897. London: Harrison & Sons, 1898. Size 8½ × 6, pp. vi. and 224. *Illustrations. Presented by the Royal Society.*

This is a record of the History of the Royal Society designed to relieve the Year-book of matter which does not require to be frequently altered.

Spanish Colonies. *G.Z.* **4** (1898): 425–431. **Zimmermann.**

Der Ausgang des spanischen Kolonialreichs. Von Dr. Zimmermann.

A sketch of the dwindling of the Spanish colonial empire.

NEW MAPS.

By J. COLES, *Map Curator*, R.G.S.

EUROPE.

England and Wales. **Ordnance Survey.**

Publications issued since October 8, 1898.

1-inch—General Maps:—

ENGLAND AND WALES (revision):—34, 173, 177, 193, 203, 210, 228, 251, 278, 294, 309, 310, 325, engraved in outline; 252, 282, 297, 300, 312, 328, 339, 350, hills engraved in black or brown. 1*s.* each. 264, hills engraved in black or brown (new series).

6-inch—County Maps:—

ENGLAND AND WALES (revision):—**Derbyshire**, 3 N.E., 6 S.E., 7 S.E. **Essex**, 3 N.W., 18 N.W., 30 S.W., 47 S.W., 81 N.E. **Hampshire**, 14 S.W., S.E., 22 N.W., 38 N.E., 47 N.E., 53 N.W., 55 S.E., 70 S.E., 72 S.W., 73 N.E., S.W., 74 S.E., 75 S.W., 79 N.W., 84 S.W. **Kent**, 1 S.E., 2 S.W., 4 S.W., 10 S.E., 11 S.E., 14 S.W., 15 N.W., 21 S.W., 22 N.W., S.E., 31 S.W., 34 N.E., 36 S.E., 64 N.E. **Northumberland**, 60 N.E., 62 N.E., 91 S.W., 106 N.E. **Sussex**, 49 N.W., 50 N.E. **Surrey**, 8 S.W.

25-inch—Parish Maps:—

ENGLAND AND WALES (revision):—**Berkshire**, XXIII. 2, 6. **Buckinghamshire**, XXXVIII. 6, 8; XXXIX. 2, 3, 4, 6, 7, 8, 9, 10, 11, 15; XLII. 3, 4, 6, 9, 10, 14, 15, 16; XLIII. 3, 4, 5, 6, 7, 8, 11, 12, 14, 16; XLV. 4, 8, 12, 16; XLVI. 6, 7, 10, 11, 12, 13, 15; XLVII. 3, 6, 7; LI. 1, 2, 3, 6. **Derbyshire**, I. 14, 15; II. 4, 8; III. 1, 5; V. 2, 6; XII. 1; XV. 13; XVIII. 13; XXI. 4; XXII. 1, 7, 8. 9, 10, 12; XXIV. 12; XXV. 1; XXVI. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13. **Hampshire**, LXXXIII. 3; LXXXVI. 5, 9, 10, 12, 13. **Cheshire**, III. 10; VIII. 8, 12; X. 7, 16; XI. 1, 4, 8, 11, 14; XVI. 6, 7, 8, 12, 13; XVII. 5, 6, 9; XVIII. 6; XX. 11; XXV. 1, 6, 10, 11, 13, 14; XXIX. 8, 12; XXXII. 11, 12, 15, 16; XXXIII. 1, 2, 6, 8, 9, 10, 11, 13; XXXIV. 6; XXXVII. 4; XXXIX. 11; XL. 8; XLI. 9; XLVI. 12, 16; XLVII. 3, 4, 5, 6, 9, 13, 14; LIII. 4, 8, 12; LIV. 1, 2, 3, 4, 11, 12; LVI. 13; LX. 10, 14, 15; LXIV. 2, 8. **Glamorganshire**, I. 15, 16; II. 11, 13, 15, 16; VII. 14; VIII. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 15, 16; XXII. 4, 7, 8, 11, 12, 16; XXXI. 4; **Hertfordshire**, XXIII. 6; XXVI. 3; XXXIII. 9, 10, 14; XXXVII. 6; XXXVIII. 9, 13, 15; XLI. 12. **Kent**, XIII. 6; LVIII. 4; LXVIII. 2, 3, 5, 6, 11, 13; LXIX. 2, 4, 7; LXXIV. 14, 15, 16; LXXV. 4 and 8, 9, 10; LXXVI. 1 and 2; LXXVIII. 1, 3, 7, 15, 16; LXXIX. 7, 9, 10, 11, 12, 14, 16; LXXX. 11, 14; LXXXIII. 1, 3, 4, 6, 11, 15. **Northumberland**, I. 15, 16; III. 3, 4, 7, 8, 11, 12, 15, 16; IV. 1, 14; VI. 2, 3; VII. 1, 2; IX. 3. **Nottinghamshire**, V. 7, 10, 11, 14, 15; VIII. 1 and 2, 3, 5 and 6, 7, 9, 10; XIII. 2, 11; XVII. 8, 12. **Oxfordshire**, XLVI. 6, 7, 8, 11, 12, 15, 16; XLVII. 5, 6, 7, 9, 11, 13, 14, 15; XLIX. 4, 8, 12; L. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 16; LIII. 2, 3, 4, 7, 14; LIV. 1. **Surrey**, XIV. 8 (this country is now complete). **Sussex**, VII. 15; XVIII. 3, 8, 12, 16; XIX. 5, 14; XXX. 1, 7, 12; XXXI. 7, 8, 11, 12, 13, 14, 15, 16; XXXII. 11, 12, 13, 14, 15, 16; XLV. 4, 8; XLVI. 1, 9, 13. **Westmorland**, IV. 13, 14, 15; VII. 12; VIII. 1, 2, 3, 6, 7, 10, 11, 15; XIV. 14; XXI. 4; XXII. 1, 2, 3, 4, 8, 12; XXIII. 2, 5, 8, 10, 11, 12, 13, 14, 16; XXIV. 2, 5, 6, 9, 10; XXIX. 4; XXX. 1, 2, 3. 3*s.* each.

MISCELLANEOUS:—One-inch Parish Indexes, printed in colours, showing 25-inch parish maps only: Sheets 2, 7, 8, 10, 25, 85, 86, 98, 99, 110, 204, 221, 222, 223, 224, 257, 271. *Price* 1*s.* each. These are also published showing 6-inch quarter-sheets only, *price* 1*s.* each.

(*E. Stanford, Agent.*)

German Marine Atlas. **Langhans.**

Justus Perthes' Deutscher Marine-Atlas. Bearbeitet von Paul Langhans. Gotha: Justus Perthes, 1898. *Price* 1 *mark.*

This little atlas contains five sheets of maps, all of which have reference to German colonies and commerce, as well as German naval stations. A large amount of statistical and general information is given in the introduction.

Historical Atlas. **Poole.**

Historical Atlas of Modern Europe, from the Decline of the Roman Empire; comprising also maps of parts of Asia and of the New World, connected with European History. Edited by Reginald Lane Poole, M.A., PH.D., Fellow of

Magdalen College and Lecturer in Diplomatic in the University of Oxford. Part xx. Oxford: The Clarendon Press; London, Edinburgh, Glasgow, and New York: Henry Frowde, M.A.; Edinburgh: W. & A. K. Johnston, 1898. *Price* 3*s.* 6*d. each part. Presented by the Clarendon Press.*

Part No. xx. of this atlas contains the following maps: No. 13, Europe (1814–1863), by Prof. G. W. Prothero, LITT. D.; No. 57, Gallia Sacra, by W. E. Rhodes, M.A.; No. 80, Western Asia under the Mongols (A.D. 1330), by Stanley Lane-Poole, M.A. Each of these maps is accompanied by letterpress.

Hungary. **Direction Générale R. H. des Postes et des Télégraphs.**

Carte Postale et Télégraphique des Pays de la Couronne de Hongrie. Scale 1: 576,000 or 9·1 stat. miles to an inch. Direction Générale R. H. des Postes et des Télégraphs, Budapest, 1898. *Presented by R. K. Gray, Esq.*

This map shows all the administrative divisions of the Kingdom of Hungary, with the telegraphs and means of postal communications. Inset plans are given of Budapest, and one of South-Eastern Europe.

Iceland. **Thoroddsen.**

Geologische Karte eines Teiles des nördlichen Island. Scale 1: 800,000 or 12·6 stat. miles to an inch. Von Th. Thoroddsen, 1896. *Petermanns Geographische Mitteilungen*, Jahrgang 1898, Tafel 16. Gotha: Justus Perthes. *Presented by the Publisher.*

Novaya Zemlya. **Buschtejew.**

Aufnahme der Bjeluschja- und Rogatschew-Bai, Nowaja Semlja, von Schiffsleutnant A. v. Buschtejew, 1896. Scale 1: 250,000 or 3·9 stat. miles to an inch. *Petermanns Geographische Mitteilungen*, Jahrgang 1898. Gotha: Justus Perthes. *Presented by the Publisher.*

ASIA.

Chinese Empire and Japan. **Philip.**

Special Map of the Chinese Empire and Japan, showing the recent Railway Concessions. Scale 1: 9,855,000 or 155·6 stat. miles to an inch. George Philip & Son. London, 1898. *Price* 1*s. Presented by the Publishers.*

Persia.

Map of Persia. Scale 1: 1,900,000 or 30 stat. miles to an inch. In Persian character. *Presented by A. P. H. Hotz, Esq.*

Siberia. **Petermann's Geographische Mitteilungen.**

Tiefenkarte der Ob- und Jenissei-Mündungen. Nach den Aufnahmen der russischen Marine in den Jahren 1894 bis 1896. Scale 1: 3,500,000 or 55·2 stat. miles to an inch. *Petermanns Geographische Mitteilungen*, Jahrgang 1898, Tafel 17. Gotha: Justus Perthes. *Presented by the Publisher.*

Transcaspian. **Radde and Konschin.**

Karte der transkaspischen Gebiete und von Nord-Chorassan. Hauptsächlich nach General J. Stebnitzkis Karte von Transkaspien mit Nachträgen und den Routen der Forschungs-Expeditionen unter Dr. G. Radde und J. M. Konschin, 1881 bis 1886. Scale 1: 2,250,000 or 33·9 stat. miles to an inch.—Nebenkarte: Oase Merw. Scale 1: 1,250,000 or 17·7 stat. miles to an inch. *Petermanns Geographische Mitteilungen*, Ergänzungsheft, No. 126. Gotha: Justus Perthes. *Presented by the Publisher.*

AFRICA.

Africa. **Service Géographique de l'Armée, Paris.**

Carte de l'Afrique. Scale 1: 2,000,000 or 31·1 stat. miles to an inch. Sheets: 19, Agadez; 20, Yayo; 37, Barderah. Service Géographique de l'Armée, Paris. *Price* 1 *fr. each sheet.*

Africa. **Philip.**

Special Map of Africa showing Treaty Boundaries. Scale 1: 16,279,200 or 258 stat. miles to an inch. George Philip & Son, London, 1898. *Presented by the Publishers.*

Algeria. **Service Géographique de l'Armée, Paris.**

Carte d'Algerie. Scale 1: 50,000 or 0·78 stat. mile to an inch. Sheets: 99, Sedrata, 131 Ammi Moussa. Service Géographique de l'Armée, Paris. *Price* 1.50 *fr. each sheet.*

Egypt. **Philip.**

Map of the Nile Valley, showing the approaches to Khartum. Scale 1 : 8,395,000 or 132·5 stat. miles to an inch.—Special Map of the Nile from Dongola to Khartum. Scale 1 : 1,013,760 or 16 stat. miles to an inch.—Environs of Omdurman. Scale 253,440 or 4 stat. miles to an inch. George Philip & Son, London, 1898. *Price* 1s. *Presented by the Publishers.*

Tunis. **Service Géographique de l'Armée, Paris.**

Carte topographique de la Tunisie. Scale 1 : 50,000 or 0·78 stat. mile to an inch. Sheets : lxv., Djemmal. Service Géographique de l'Armée, Paris. *Price* 1.50 *fr.*

AMERICA.

Bolivia. **Cisneros and Garcia.**

Mapa de Bolivia. Scale 1 : 3,410,700 or 53·8 stat. miles to an inch. By C. B. Cisneros and R. E. Garcia. Lima, 1897.

Chile. **Delegacion Fiscal de Salitreras.**

Plano de la Region Salitrera desde Arica a Tocopilla. Scale 1 : 202,752 or 3·2 stat. miles to an inch. Delegacion Fiscal de Salitreras, Iquique, 1896. *Presented by the Director of the Biblioteca del Instituto Nacional, Santiago de Chile.*

The object with which this map is published is to show the position and extent of the nitrate deposits. The map includes the country lying between Arica and Tocopilla on the coast, and 68° west longitude. All means of communication are laid down, and the heights of a few places near the railway stations and aqueducts are given. Though this map will be principally of value to those interested in the nitrate industry, it also contains much geographical information with regard to this desert region.

GENERAL.

World. **Bartholomew.**

The Citizen's Atlas. One hundred maps and gazetteer. By J. G. Bartholomew, F.R.G.S. Published by George Newnes, Ltd., London. To be completed in 20 parts, issued fortnightly. Parts 17, 18, and 19. Price 6*d.* each.

World. **Andree.**

Andrees allgemeiner Handatlas, 126 Haupt- und 130 Nebenkarten auf 186 Kartenseiten, nebst alphabetischem Namenverzeichnis. Vierte, völlig neubearbeitete, stark vermehrte Auflage, herausgegeben von A. Scobel. Bielefeld und Leipzig : Verlag von Velhegen and Klasing, 1898.

Lief 34, Südeuropa und Mittelmeer, Verkehrskarte : Persien, Afghanistan und Balutschistan.—Lief 35, Westafrikanische Kolonialkarten : Deutsch-Ostafrika : Südwestliche Vereinigte Staaten and nördliches Mexico.—Lief 36, Verkehrskarte des Atlantischen Ozeans : Vorderindien, nördlicher Teil.—Lief 37, Ungarn und Galizien ; Algerien und Tunesien.—Lief 38, Übersichtskarte von Asien. Price 50 *pf. each part.*

CHARTS.

Ocean Currents. **Jordan.**

Charts of the World, North and South Atlantic Oceans, North Atlantic from the British Isles to the Mediterranean Sea, and the N.W. portion of the North Pacific Ocean, illustrating Ocean Currents and Tide Waves. By W. Leighton Jordan. *Presented by W. Leighton Jordan, Esq.*

These are Admiralty Charts, on which Mr. Leighton Jordan exhibits the ocean currents and tide waves, according to his theory. In addition to the coloured lines indicating the currents, numerous explanatory notes are given upon each chart.

Portuguese Charts. **Commissão de Cartographia, Lisbon.**

Plano hydrographico da Enseada da Agoada e Barra do Rio Mandovi Goa. Scale 1 : 10,000 or 0·15 stat. miles to an inch, 1898.—Reconhecimento da Bahia e Rio Conducia Moçambique. Scale 1 : 31,680 or 5 stat. miles to an inch. Ministerio da Marinha e Ultramar, Commissão de Cartographia, Lisbon, 1898. *Presented by the Commissão de Cartographia, Lisbon.*

Russian Charts. **Chief Hydrographic Department, St. Petersburg.**

Charts and Plans published by the Chief Hydrographic Department, Ministry of Marine, St. Petersburg.

United States Charts. **U.S. Hydrographic Office.**

Pilot Charts of the North Atlantic and North Pacific Oceans for October and November, 1898. Published at the Hydrographic Office, Washington, D.C. *Presented by the U.S. Hydrographic Office.*

The Baltic.

No.

1793. Index Sheet of Charts and Plans of the Gulfs of Finland, Mohn Sound, and Riga. Published in 1897; corrected in 1898.

199. Plan of the Soundings at the Mouth of the River Pernova (Gulf of Riga), 1898. Scale 700 feet to an inch.

1698. General Chart of the Gulf of Bothnia. Compiled from the latest Russian and Swedish Charts. Published in 1882. Scale 11 stat. miles to an inch.
Plan of the Entrance into the Roadstead and Harbour of Hango. Surveyed in 1839. Scale 3500 feet to an inch.

1661. Index Sheet of the Charts and Plans of the Baltic Sea, with the rocks of Abo and Aland, the Mohn Sound, and the Gulf of Riga. Published in 1898.

1786. Index sheet of the Charts and Plans of the Gulf of Bothnia. Published in 1898. Scale 18 stat. miles to an inch.

1758. Chart of the Central Part of Mohn Sound, south of the Island of Vorms. Published in 1896; corrected in 1898. Scale 2745 feet to an inch.

1323. (*a*) Chart of the Western Coast of the Gulf of Bothnia, from the Svartklubben lighthouse to the city of Hudiksvall. Compiled from the Swedish chart of 1866; published in 1867; and corrected 1890–98. Scale 3·1 stat. miles to an inch.
(*b*) Plan of the Entrance into Gefle (Sweden). Scale 1·2 stat. mile to an inch.

490. Chart of the Roadstead of Riga and the Mouth of the Western Dvina. Surveys and sounding of 1848–91 and 1896; published in 1897. Scale 2059 feet to an inch.

190. Plan of the Mouth of the River Narova, 1898. Scale 700 feet to an inch.

The White Sea and Arctic Ocean.

1803. Charts of the Roadstead of Onega and of the Entrances into the River Onega. According to the Hydrographic Survey of the White Sea, 1888-90. Published in 1895; corrected in 1898. Scale 3500 feet to an inch.

493. Plan of Survey and Soundings near Kuya, on the river Petchora. Published in 1898. Scale 700 feet to an inch.

1299. Chart of the Coast of Russian Lapland, from Kildin Island to Ribachi Peninsula. According to Captain Lütke and Lieut. Reinike. Published in 1840. Corrected according to Norwegian Survey of 1849, and Russian Surveys of 1870, 1888, and 1893–98. With Plans.

500. Plans of Anchorages on the Coast of Russian Lapland. Published in 1898.
(*a*) Bolshaya Ainof Island. Scale 1890 feet to an inch.
(*b*) The Creek Bolshaya Volokovaya. Scale 2380 feet to an inch.
(*c*) Anchorage near Malyi Island, Kildin. Scale 2380 Russian feet to an inch.
(*d*) Plan of the Lake Mogilnoye, in the south-east part of Kildin Island. Scale 2380 feet to an inch.

504 (A.) Provisional Plan of Part of Berezovyi, arm of the Northern Dvina, from the Modyukski Lighthouse to the Harbour of Lapominka. Surveys of Lieut. Kolinin, 1891–93; and published in 1898. Scale 5·3 stat. miles to an inch.

504 (B.) Provisional Plan of the River Maimaksa, from the Harbour of Lapominka to the city of Archangel. Surveyed by Lieut. Kolinin, 1891–93; published in 1898. Scale 2800 feet to an inch.

1805. Chart of the Gulf of Kovda, in the Gulf of Kandalak. Survey of 1891; corrected in 1898. Scale 2164 feet to an inch.

1804. Plans of the Channel in the Roadstead at the village of Porya, and of the anchorage in this Roadstead (Kandalak coast). Scale 3580 feet to an inch for the channel, and 1792 feet to an inch for the anchorage.

1802. Chart of the Soroka or Sorokskaya Creek, in the Bay of Onega. Surveys, 1887, 1888, 1893, and 1894; published in 1896; corrected in 1898. Scale 3500 feet to an inch.

1801. Chart of the Roadsteads of Solovetzk. Surveys 1889 and 1892; published in 1895; corrected in 1898. Scale 525 feet to an inch.

510. Plan of Nakhodka Creek in the Gulf of Obi. Constructed according to Survey of the Hydrographic Expedition for the study of the estuaries of the Yenisei and Obi, and part of the Kara Sea, 1897. Published in 1898. Scale 3484 feet to an inch.

1747. Plans of anchorages in the Central Part of the West Coast of Novaya Zemlya: (1) Plan of the Bay Melkü; (2) Plan of Pomorskaya or

Staroverskaya Creek; (3) Plan of the Western Mouth of Matyushin Shar; (4) Plan of Gribovaya Creek.

491. Plan of the Soundings along the Coast of Alekseyef (Yerupan) Island, in the mouth of the River Petchora. Surveyed in 1894; published in 1898.

492. Plan of the Bay of Bolvansk, in the estuary of the Petchora River. Surveyed by Lieut. Prestin, 1894; published in 1897.

497. Plan of the Southern Part of the Bay of Kola. From surveys and soundings by Captain Deploranski and officers of the cruiser *Djigit*, 1895. Published in 1898. Scale 2100 feet to an inch.

1518. Chart of the Northern Coast of Russian Lapland. From surveys by Captains Lütke and Reinike, 1822–32, and from the Norwegian chart of Captain Bibi, 1848; corrected in 1890, 1892–98. Scale 9·4 stat. miles to an inch.

1284. (*a*) Chart of the Coast of Lapland, from the Gulf of Zelenetzkaya to the Gulf of Varishikha. By Captains Lütke and Reinike, 1840; corrected in 1890, 1892–98. Scale 3·9 stat. miles to an inch.

(*b*) Chart of the Strait of Kildin and the Gulfs Zelenetzkaya and Dolgaya. By Captains Lütke and Reinike, 1822 and 1826.

(*c*) Chart of the Gulf of Teribersk. By Captain Lütke in 1823; corrected in 1890 and 1892–98.

(*d*) Plan of the Island of Voronyi Ludki and the cantonment of Gavrilovoye. Surveyed by the officers of the transport *Samoyed*, 1897.

(*e*) Chart of Oleni (Reindeer) Island. By Captain Lütke in 1822; corrected in 1890, 1892–98.

The Black and Caspian Seas.

1781. Chart of the South-Eastern Coast of the Crimea from Cape Panagi to Fort Cudak. Description of the Black Sea Hydrographical Expedition, 1872–93. Published in 1897; corrected in 1898. Scale 2 stat. miles to an inch.

1794. Chart of the Gulf of Karkinitzki (West Coast of the Crimea). Surveyed by Black Sea Hydrographical Expedition, 1874–91; published in 1898. Scale 2·3 miles to an inch.

1732. Chart of the North-Eastern Part of the Black Sea from the Strait of Kepchenski to the creek of Gelendjukski. Surveyed by the Black Sea Hydrographical Expedition, 1871–85. Published by the Administration of Lighthouses and Pilots of the Black Sea and Sea of Azof in 1889; corrected in 1892, 1895, 1897, and 1898.

Plan of the Roadstead of Anapa. Described by the Black Sea Hydrographical Expedition, 1873, 1876, 1884. With additions to 1898. Scale 3500 feet to an inch.

Plan of Gelendjuski Creek. Surveyed by the Black Sea Hydrographical Expedition, 1875–84; published in 1898. Scale 800 feet to an inch.

1665. General Chart of the Caspian Sea, constructed according to astronomical observations, surveys, and soundings of 1858–71, under directions of Rear-Admiral Ivashinzof, and from 1871–78, under directions of Captain Pushchin. Published 1898.

1662. Chart of the Strait of Apsheron. Surveyed by Captain Ivashinzof, 1857–58; published 1860.

1568. Chart of the West Coast of Apsheron Peninsula. Surveyed in 1854–60 under direction of Captain Ivashinzof; published in 1862. Scale 2·8 stat. miles to an inch.

1789. Chart of Part of the Black Sea, from the town of Ochakof to the Liman of the Dniester, 1871–87; corrected to 1898. Scale 1·7 stat. mile to an inch.

The North Pacific Ocean.

383. Plan of Tyulenü (Seal) Island in the Bay of Patience, Sea of Okhotsk. By Lieut. Maksimof and M. Gulyarovski, 1891; published in 1898. Scale 280 feet to an inch.

496. Provisional Chart of the Bay of Possiet, and Expedition and Novgorod Creeks in Peter the Great Bay. Surveyed 1884–95; published in 1898. Scale 4540 feet to an inch.

1795. Chart of the Eastern Part of Kozakevich Island and Part of Muravief Amurski Peninsula, in Peter the Great Bay. Surveys of the Pacific, 1875–96; published in 1898. Scale 2798 feet to an inch.

1796. Chart of the Western part of Kozakevich Island in Peter the Great Bay. Surveyed 1881–91; published in 1898. Scale 2798 feet to an inch.

509. Plan of the Vostok Bay, with Gaidamak Creek in Peter the Great Bay. Surveyed in 1896; published in 1898. Scale 1400 feet to an inch.

507. Plan of the Gulf of America, with Nakhodka, Wrangel, and Kosmin Creeks in Peter the Great Bay. Surveys of the Pacific, 1896 and 1897; corrected in 1898.

1787. Index Sheet of the Charts and Plans of the Sea of Japan and Yellow Sea, with the Straits of Korea, Sangar, Tartary, and La Perouse. Published in 1897; corrected in 1898.

1657. Index Sheet of the Charts and Plans of the Seas of Bering and Okhotsk. Published 1897; corrected 1897–98.

506. Plan of the Bay of Ayan (Sea of Okhotsk). Surveyed by Staff-Captain Lelyakin, 1897; published in 1898. Scale 700 Russian feet to an inch.

Plan of the Gulf Zabiyaka and Van der Schruff Creek (Sea of Okhotsk). Surveyed by Staff-Captain Lelyakin, 1897; published in 1898. Scale 2800 feet to an inch.

512. Provisional Plan of Gulf of Ta-lien-wan. Survey of the officers of H.M.S. *Acteon* and *Dove*, 1860. Published in 1898. Scale 1·1 stat. mile to an inch.

Plan of the creek Odin. Survey of the officers of H.M.S. *Immortality*, 1876.

488. Chart of the Northern Part of the Gulf of Tartary, from the estuary of the Amur to the Port of Imperator. Compiled from Hydrographical and Topographical Surveys of 1852–1883, and published in 1898. Scale 6·6 stat. miles to an inch.

271. Plan of Tikhaya Pristan Harbour (Calm Harbour) in the Bay of St. Olga, Sea of Japan. By Captain Krykof and M. Polovzof of the Corps of Naval Pilots, 1879. Published in 1898. Scale 348 feet to an inch.

480. Chart of Part of the East Coast of Korea, from Port Shestakof to Port Lazaref. Surveys, 1886-95; published in 1897. Scale 1·9 stat. mile to an inch.

508 (*a*) Plan of Port Lazaref and the Vensan Creek (Genzan), East Coast of Korea. From Russian surveys, 1854 and 1893-97, and Japanese surveys of 1878; published in 1898. Scale 1 stat. mile to an inch.

(*b*) Plan of Unkovski Creek on the East Coast of Korea. Surveyed by officers of the frigate *Pallada*, 1889. Scale 1·1 stat. mile to an inch.

505. Plan of the Harbour of Petropavlovsk (Kamchatka), survey of the cruiser *Kreuzer*, 1896; published in 1898. Scale 385 feet to an inch.

298. Plans of Harbours and Creeks on the East Coast of Karyakskaya Zemlya, Kamchatka:—(1) Part of the Southern Part of Ugolnaya Creek; (2) Plan of Ugolnaya Creek, between Capes Faddei (Thaddeus) and Günter; (3) Plan of Archangel Gabriel Creek; (4) Plan of the Harbour of Natali; (5) Plan of the Harbour of Lavrof; (6) Plan of Anastasius Creek; (7) Plan of the Harbour of Glubokaya; (8) Plan of the Entrance into the Harbour of Skrytaya; (9) Plan of Karaga Harbour; (10) Plan of Lojnikh Vestei Creek; (11) Chart of Baron Korf Bay, with Harbours. Published in 1898.

501. Chart of Komandorski Island (Commander Group) in the South-Western part of Bering Sea. Corrected by Lieut. Stahl, Hydrographic Survey of the cruiser *Zabiyaka*, 1894, with additions from Plans of Steinger, 1897, and published in 1898. Scale 6·9 stat. miles to an inch.

502. Plans of Anchorages on the Coasts of Komandorski Islands, published in 1898:—(1) Plan of the Northern Coast of Bering Island, 1894; (2) Plan of the Southern Coast of Bering Island, 1895; (3) Plan of the Old Harbour on Bering Island, 1882; (4) Plan of Peschanaya Creek on Mednyi Island, 1882; (5) Plan of the Preobrajeniye harbour, 1882.

Presented by the Chief Hydrographic Department, St. Petersburg.

PHOTOGRAPHS.

Rockall. **Green.**

Photograph of Rockall, showing pitted weathering of the rock. By Rev. W. S. Green. *Presented by Rev. W. S. Green.*

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

34
Ibambe
Langenburg
R. Rhum
R. Songwe
Karombo
R. Lufira
Kambwe Lagoon
Kazonga
R. Rukuru
10
Bush and plain
Pamrua
WAHENGA
Deep Bay
Red Sandstone
Mt. Waller
R. Rampi
R. Rukuru
11
WASYSKA
ANGONI
High
Ranges
R. Luwegu
12
ATONGA COUNTRY
Mt. Kuerwi
4,000 feet
Pengala
Karali
Mbiri chief
Hot water springs
Dombasi
Bena
Unaka
Lagoon
Plain and bush
R. Leangwa

35
10
11
12
Village
Village
Village
Cultivated hills
Kaiker Bay
Waterfall
Village
Sandstone
ARABS AND
COAST MEN
Amelia Bay
R. Rahuhu
Florence Bay
Hot water springs
Mrowi
High plateau 2,500
Papyrus
Sphynx R.
Malundo
Mbampa Bay
Lions Cave
Nkata Bay
Chisi
C. Chirambo
Dambo
Chimtheochi
BANDAWE
Mtendo
Chisamulu
Likoma
Chitesi
Kazungo
Titonga
Malo Pt
Mbwaka
WANYASA
Limburi
Malungwa
Rye Pt
Pangwa
Chisama
Rocky Shoal
Mumba

BANDAWE

Chisamulu

Liku

ATONGA CO

Mt Kuerwi 4,000 feet

Mangala

Karali

Mbiri chief's Hot water springs

Dombasi

Bana

Unaka Lagoon

Plain and bush

R. Loangwa

Sand dune

R. Bua

Bua Point

JUMBE'S

Mbuna

Kota Kota I.

Fuarwe I.

KOTA KOTA

Swampy Lake

Sani Hill 700

COUNTRY

Chia

R. Mkula

Bush

Banji I. (300

Damira Bay

Coast

Kajura

Ft Rifu

R. Lintipi

Maganga

R. Lingadzi

Mpem

Chindunga

Intakata R.

Kachindamoto

Matapua

R. Lovilezi

LAKE NYAS

COMPILED FROM THE OBSERVATIO

LIEUTS E.L. RHOADES & W.B. PHILLI

OF THE BRITISH CENTRAL AFRICA PROT

English Miles

0 5 10 20 30 40

Natural scale 1:1,000,000 or 15·78 miles

Heights in Feet.

Soundings in Fathoms.

34

Published by the Roya

Mtendo
12
Chitesi
Kaango
Titonga
WANYASA
Mburuka
Limbiri
Makungwa
Rye Pt
Pangoa
Chisama
Rocky Shoal
Pechia
Mumba
Rocky patch F.D.
R. Malabwe
Chingomanji
Danger Rk
Lululuka
High Plateau
3000 - 4000 ft.
Lesowa
White Rocks
13
900
Mapanji Hills
3000
Chilowelo
Luongwa
400
C. Barbari
R. Msinji
Ft Maguire
Mikombe R.
Limgrana
White R.
Lukolomo
4500
Namazim Mts
14
Maleri I.
Zimbawe R.
C. Maclear
Elephant or Tumbi I.
Devils R.
4000
Mumbo I.
Monkey B.
Chiponda
4000
Livingstonia
Malaburi
Kasanga
Wankumbu
Y A O
Sangasi
Mpati
Dimbo
Pansitu
Mlembo
Nkudzi
Mkapi
Ulandi
Kadango
Boadzuru I.
Crocodile R.
Gurney Hill
Nidoka
Old Ft Johnston
Mponda
New Ft Johnston
Malombe Bar
L. PAMALOMBE
High range of hills
Mwera
A S A
ATION OF
LLIPS R.N.R.
ROTECTORATE.
30
60
miles 1 inch.
15
Ft Liwonde
Saba Mt
Rock The Stones
Ft Sharpe
Kundusi Mt
Mpimpi
High red cliffs
Mntope
35
e Royal Geographical Society.

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